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Artillery—Arbiter of the Battlefield

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The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

INFANTRY and tank commanders are acutely aware of the value of concentrated artillery fires on targets which stand in the way of the successful accomplishment of their missions. The experience of war bears out the concept that success in battle hinges in large measure on massed fire power. Looming on the horizon are tactical weapons of hitherto unimagined capacity. The early availability of these weapons to the artillery gives new emphasis to the already recognized worth of that arm.

Evolution and Employment Of Artillery

In the past, it was the nature of the task confronting our Army as a whole which governed the evolution of artillery and its employment. While this must always be true to a certain extent, sensational and striking developments in the power of its weapons introduce problems which cannot be solved in the light of the past. Commanders will have at their disposal not merely a "powerful means" but a *magnificent instrument* "for influencing the course of battle." The problems concerning the tactical employment and control of artillery and concerning the organization to accomplish desired objectives in that respect must be viewed in a light as unprecedented as the power of the weapons which give rise to those problems.

The co-operation of all arms is the foundation rock on which tactics is built. Closely linked with this principle in the past has been the provision of continuous support by artillery. If the infantry is still the arm that confirms victory, and of that there can be no doubt, then it is axiomatic that the energies of the other arms must be directed toward enabling the infantry to close with the enemy and deliver the finishing stroke.

For the artilleryman, however, mighty and rapid changes are in progress. Those changes threaten to sweep away preconceived notions concerning the role of artillery in future warfare. Thus, the artillery may become the arbiter of a battle in which all other arms assist in enabling it to exploit its power to the hilt.

Artillery, as the principal support of infantry and armor, contributes to the action of the entire force. The development of its tactics and techniques are, therefore, of vital concern to all of the combat arms

Questions to Answer

The object of an army is to win battles. Our Army must make certain that the techniques of all its components keep pace with the evolution of their respective weapons. If it fails to do this, decisive battles may be lost. The demands made upon the artillery in the future will perforce exceed those made upon it in the past. It is the concern, therefore, of all arms to consider carefully how far present artillery tactics, techniques, associated equipment, and organization fit probable trends in the development of new weapons. The implications may be far reaching. Questions to be answered immediately must include the following:

1. Should the doctrine related to the tactical employment of artillery be reexamined in the light of the probable pattern of future warfare and the availability of guided missiles and atomic weapons for tactical use?

2. Are present means and methods of control adequate to meet possible changes in artillery tactics along the lines suggested by such an examination? If they are not adequate, what are the requirements?

3. Is the present organization of artillery satisfactory to meet the demands of effective tactical control? If not, what organization is best designed to satisfy those demands?

Forecasting the Future

Any attempt at answering the foregoing and related questions inevitably presents the problem of establishing the pattern of a future war as a point of departure. It is impossible and senseless to forecast events in detail, but an authoritative analysis of trends, military as well as scientific, by a military thinker of experience and standing appears to be necessary if any proposals are to have a firm basis. In the apparent absence of such an analysis, the writer intends this thesis primarily as a stimulus to further thought on the subject.

Defensive Operations

In a future war, artillery tactics must stress more than ever surprise, mass, unity of effort, maneuver, and economy of force. These are the same principles which guide the Army as a whole. Presumably, the defense will predominate the initial phase. Therefore, counterbattery will be important, particularly if the enemy possesses a superiority of artillery. Fires must be massed to break up attacks against *any portion* of the battle position. The close-support role will, therefore, be less important. In spite of extended areas of responsibility, every gun must be under centralized control. Since it will be impossible to be safe everywhere, some risks will have to be taken, and the bulk of the effort must be concentrated on the essential. Control must be in the hands of a commander whose tactical viewpoint is wide enough to permit an objective evaluation of targets and a separation of the essential from the not-so-important. Presumably, this commander will be at the corps level in most instances.

Flexibility of maneuver is an inherent characteristic of artillery fire. The requirements of security and protection in the defense on an excessively wide front may necessitate the siting of artillery positions within areas held by front-line infantry battalions. That method of providing security will impose severe restrictions on the artillery's flexibility unless some effective measures to offset the restrictions are worked out. If no satisfactory solution is found, the security achieved will be a mere illusion.

With battalions, perhaps even batteries, widely separated, the division artillery will find it difficult, if not virtually impossible, to concentrate its fires on areas that are, for the moment, of decisive importance. Yet victory in the defense is dependent on controlled concentrations on

such areas, and not on the desperate fighting of individual batteries or battalions. Effective artillery depends on more than just hitting the target. It depends on the sound application of fire through fire direction. That was found to be true at the battalion and division levels during World War II, and it will be even more true at the corps level in the future. The answer, of course, is in reinforcing artillery. However, since we cannot possibly afford a gun density that will give every division all the guns it might need to meet all possible contingencies, the reinforcing artillery must be held under corps control to ensure that the available fire power is applied to the most vital targets.

Offensive Operations

When the time becomes ripe for offensive action, our over-all land strategy must take into account the likelihood that our enemy will be operating from a base of supply which is vast in area, widely scattered, and with limited communications facilities as compared with our own. It may not be feasible to invade and overrun such an area in order to secure a decision. The opposing armies may be forced to engage in mobile operations in an area quite distinct from their respective defensive bases and to seek a decision in that area. *The destruction of the enemy's army then is a prerequisite to winning the land war. Our margin of superiority will have to be developed in that direction.*

The ferocity of atomic weapons being what it is, it may be possible that we shall return to the type of warfare for which the Middle Ages was noted, but on a larger and more rapid scale. We may go back to the days when an entire enemy force could be encompassed and annihilated with one stroke. The stratagem and the ambuscade may come into its own again as a means of exploiting the power of our weapons. By inducing the enemy to concentrate as close to the point of intended attack instead of as far away from it as possible, land strategy will then become a matter of atomic bombardment followed by seizure of limited *strategic* objectives of vital importance.

In the offense, priority of division artillery fire will continue to be given to normal close-support missions, reinforced as the situation requires. Additional emphasis will be placed on the mass employment of artillery to neutralize the first defensive position. For corps artillery, however, first priority must be given to the mission of *neutralization in depth.* This mission will include counterbattery to deal with strong concentrations of enemy artillery, the annihilation of fortified positions, the neutralization of enemy reserve positions and command posts, and the interdiction of the approach of reserves and of supply routes. More stress must be placed on the creation of a greater density of fire within a shorter period of time with a relatively small expenditure of ammunition per gun. Prolonged bombardments should be avoided. They are apt to be disappointing in results, because surprise is necessarily lost, and the rain of shells hinders rather than assists the movement of infantry.

Artillery preparations must be laid on with hurricane-like speed and ferocity to clear the way for infantry and tanks, and destroy hostile weapons and manpower. These techniques must be applied at night, as well as during daylight, in conjunction with searchlights to blind the enemy and illuminate the battlefield. Counterattacks must be anticipated by fire on concentrations of enemy tanks and infantry. During the pursuit phase, long-range artillery will be used to interdict crossroads and defiles to delay the withdrawal and the subsequent arrival of reinforcements.

The foregoing concept presupposes the closest type of co-ordination and control at a level above the division. The success of these tactics will also depend largely

on detailed and accurate intelligence, the complete co-ordination of all artillery, fully developed communications, the prior provision of adequate stocks of ammunition, adequate transport to maintain momentum, and the close co-ordination of fire and movement.

Concentrated Fire Power

Just prior to World War II, field artillery fire direction underwent a revolutionary change in response to the demand for a greater concentration of fire power. Simplified methods of spotting based on air observation methods and centralized control of battalion fires were at the foundation of that evolution. As events proved, the change took place none too soon, for it was not long thereafter that the new methods were subjected to the test of the battlefield. In fact, it was not until the war had been in progress several years that the techniques reached their highest peak of development as experience revealed new and better ways of applying them. Thus, in the European theater by the end of 1944, procedures had been developed to permit the conduct of fire by any front-line soldier who had observation and communications. By that time, too, the division artillery fire direction center had adapted existing communications facilities to speed up the delivery of concentrations by as many as 20 battalions of artillery on a single area target.

Present and Future Progress

Since the termination of hostilities, very little progress along similar lines is in evidence. Research and development during the past 6 years has been directed toward the development of new weapons and the improvement of existing weapons—weapons which have already approached the optimum in evolution. Some improvement is being made today in increased range, accuracy, and mobility of artillery weapons. Guns and associated equipment are being lightened. Such improvements are naturally all to the good, but there is a crying need for increased attention to the problems of fire control and fire direction to meet the demands of future warfare. The solutions to those problems will depend largely on the following major considerations:

1. Command control of artillery fire from the air, preferably by means of helicopter.

2. Greater reliance on radio communication.

3. Establishment of a channel of wire communication for the single purpose of receiving and transmitting fire missions from adjacent, higher, and lower artillery echelons.

4. Organization of artillery to facilitate the centralization of control in the wide sectors or zones of action and to provide more rapid and more effective fire direction at the corps level.

Subsidiary considerations include the following:

1. Training of all individual soldiers in artillery observation and conduct of fire methods.

2. Use of helicopters for rapid laying and maintenance of wire lines when conditions favor the use of telephone communications.

3. Development of more rapid and accurate means of orienting artillery weapons as well as more accurate methods of locating targets, with more emphasis on centralized survey control as a basis for the accurate massing of fires.

4. Development of a lightweight mechanical data computer and transmitter for use at the battalion fire direction center to obtain increased speed and accuracy in the computation and transmission of firing data, including the ability to accept and apply spotting corrections as well as corrections for the differential effects of meteorological and ballistic conditions.

Observation and Communication

Of the foregoing considerations, per-

haps none deserves more attention nor is more readily brought about than that of command control from the air. The expanding areas of responsibility of artillery commanders which will result from the dispersal of positions laterally as well as in depth will demand an equally expanded range of observation and communication which can be obtained most effectively in the air. Too often in the past, communication facilities of artillery fire direction centers have been stretched to the breaking point under conditions requiring operations on extended frontages and decentralized control; and the reconnaissance and selection of artillery positions has been either an arduous, time-consuming business or a superficial one conducted from a map. If more centralized control is to be exercised by the corps artillery commander, the task will become an impossible or at best ineffectual one if maps and surface transportation are to be the sole reliance.

The aim of the artillery commander is to turn artillery fire on to the points needed. To do this he must have a full view of the ground, and his mind must not become too cluttered with purely local incidents. Fortified with a knowledge of friendly dispositions and the enemy before he starts, he can, from the air, complete the picture which will enable him to amend or extend his fire-support plan. His messages to the ground will be decisions which can be translated into action without having to be read in relation to other reports requiring confirmation or further evaluation. After a half-hour in the air during critical stages of the battle, in direct contact with his staff on the ground and with the corps commander, who is most directly concerned with the progress of his infantry divisions, he would be able to tackle his ground work afterward with greatly increased confidence. To make artillery command from the air feasible, the facilities afforded for observation, order writing, and the transmission of messages must be such as to permit the operation with a reasonable degree of comfort. The question of aircraft appropriate for the job is only one aspect of the subject which needs thorough investigation.

The establishment of an artillery fire direction wire net, paralleling the existing radio net, and independent of other command communications, must be considered as a standard practice instead of an expedient. Rapid communication among artillery fire direction centers cannot depend on switching facilities which are already strained under the load of administrative traffic. Circuits should bypass switchboards at the telephone centrals and terminate at switchboards located in the fire direction centers, switchboards which artillery operations officers can use as transmitting and receiving instruments.

Circuits may be simplexed to provide direct communication between the fire direction centers. Fire direction switchboards also should be provided with remotely controlled radio facilities.

Artillery Organization

Improvements in other control facilities and in the techniques of using them must be under continuous consideration if our Army is to maintain its lead position in the art of firing projectiles. However, the most advanced equipment and procedures will avail us nothing if the framework of artillery organization at all tactical levels is not designed to apply those tools in the right direction. If artillery is to play a dominant role, as it must with the advent of the guided missile and the atomic warhead, the whole attitude of the artilleryman toward the organization for controlling these weapons must change. He must particularly ask himself whether the demands of effective control can be satisfied by the organizational structure which characterized our corps artillery in the last war.

Fire Power and Maneuver

If the co-operation of all arms for battle is the foundation of all tactics, the expression of that co-operation is in fire power and maneuver, which are the fundamental elements of combat. Thus, fire power is applied prior to, during, and upon the completion of maneuver. The ultimate objective of fire power is to destroy or so neutralize the enemy that the maneuvering force can take and hold its objectives without casualties. If the ultimate objective of fire power is to be attained more than rarely, its application must be *carefully planned, timed,* and *placed* in conjunction with the movement of friendly troops; and *must be co-ordinated at the highest tactical level.* Artillery is the commander's weapon. Since the artillery forms the major portion of the fire power available to the commander, the application of its fire must not be a haphazard affair. The organization for combat of corps artillery places great stress on flexibility to permit the massing of fires quickly and accurately on a single target. Artillery fire power is inherently flexible, however, and much of the fire capabilities of corps artillery has been, and will continue to be, wasted unless more emphasis is laid on sound organization and standardized operational procedures designed to permit the rapid shifting of fires without loss of efficiency.

Corps Artillery Organization

The artillery today has no detailed operational procedures or standard organization at the corps level. And yet at the present time, corps artillery is the highest echelon engaged in the actual preparation of fire plans. It can hardly be denied that corps artillery organization for combat is one of the most important factors influencing the artillery support given to an operation. It is the corps which must evaluate the relative importance of divisional efforts and allocate means accordingly. It is the corps which has the responsibility of phasing in proper sequence the attack of targets. It is the corps upon which the function of co-ordination between adjacent divisions falls. Excluding targets on the immediate front, nearly all targets are located by agencies on the corps or higher level.

The future may well indicate the need for more and more artillery fire, not only for defense against armor and for counter-battery, but also for the creation of greater density of massed fires, accurately delivered at critical targets to neutralize enemy defense, to destroy his communications, to force him to abandon his observation and weapons, to prevent his movement on or into the battlefield, and to reduce his combat power. Since we cannot hope to get all the guns we would like to have to meet this need, more dependence than ever will be on the sound application and control of fire by corps. No artilleryman will depreciate the pre-eminent importance of flexibility, but the fetish of flexibility must not close his eyes to the absolute necessity for standardized operational procedures and a standardized and more permanent organization upon which effective control and efficiency of operations must so largely depend.

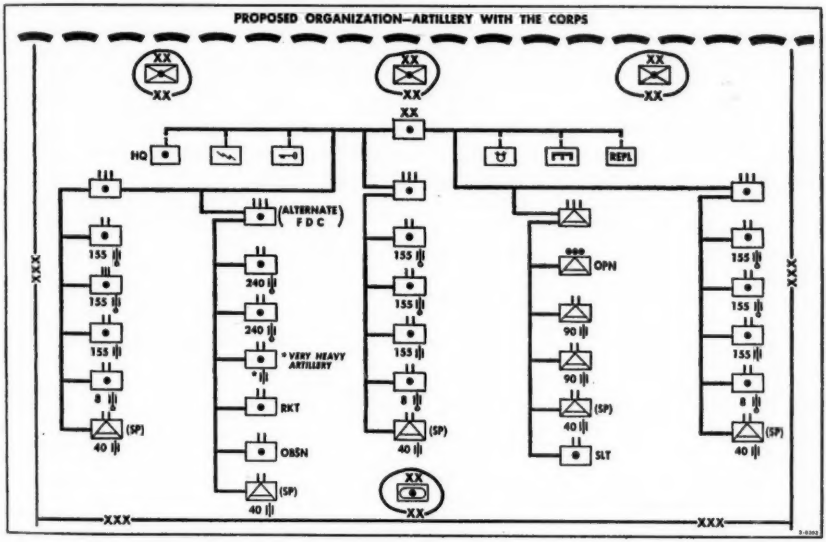
During World War II, there were as many different systems for the control of corps artillery as there were corps. There was no fixed procedure and no standard organization. Experience indicates, however, that those corps which exercised the most control and whose organization for combat was most permanent delivered the most effective fire.

Factors of Efficiency

Liaison, communications, and fire plans are the factors which govern the efficiency with which artillery fire is delivered. Those factors are, in turn, contingent upon organization for combat, and little can be done until the organization has been determined. A permanent artillery command at the corps level would greatly simplify

and expedite the determination of that organization and would give the corps artillery commander the means to control the artillery with the corps such as is now exercised by the division commander over his division.

Based on the minimum number of divisions expected to be in a corps and on the minimum requirements for artillery, a fixed number of artillery battalions



should be organic to corps artillery. These can be supplemented as necessary from an army artillery pool. The artillery allotted to the corps should be organized into a command comparable with the division to administer and command the organic artillery and such additional artillery as may be attached from the army pool.

Corps Artillery Deficiencies

The purpose of any divisional organization is to promote teamwork among its component elements, and to simplify their control and training. A divisional organization would eliminate the deficiencies which characterize corps artillery at the present time. Those deficiencies include:

1. *Lack of continuity of command.*—There is usually so much shifting of units within the corps artillery that commanders find it impossible to become familiar with the capabilities and limitations of the separate battalions.

2. *Maintenance and supply problems.*—The frequent shifting results in delays in the performance of maintenance and the obtaining of replacement parts and equipment.

3. *Technical problems.*—A high degree of standardization is necessary because of the technical procedures involved in the control and maneuver of fire. To obtain the maximum advantage of the available fire power, the constant shifting of separate battalions must be eliminated, because it has a bad effect on teamwork and efficiency.

The essence of efficiency is training and high morale. The essence of high morale is the feeling by members of an organiza-

tion that their organization is the best; and that if it does well, it will be recognized; and that superior commanders are looking after them. Any revised organization, therefore, must provide a parent organization for nondivisional artillery. The basis for such an organization is outlined in the proposed organization chart on page 9.

Conclusion

In our Army, the functions of all arms and services are essential; otherwise we would not have them. Let no soldier forget, therefore, that the Army as a whole is the sum of its parts and that all of these parts have problems and needs.

Members of the military profession are apt to remember vividly the techniques they have seen applied in combat. They tend to forget that they were being applied against a particular enemy under a specific set of circumstances.

During World War II, our corps artillery functioned very well despite the lack of a common doctrine. There were as many systems for control as there were corps. The lack of uniformity in operational practices resulted in no serious technical difficulties. There is no telling how effective it would have been if our enemy had been organized and equipped differently, or if other conditions had been different. In view of the possibility of such differences in the future, we had better look to our artillery procedures, equipment, and organization to ensure that they will meet the test of future warfare, particularly if, as appears more than likely, the artillery, from being an auxiliary arm, becomes suddenly the leading factor on the battlefield.

NEXT MONTH

Main Articles

Fire Support Co-ordination by Major H. P. Rand; and *More Effective Oversea Supply* by Lieutenant Colonel Lowell R. Eklund are included among the main articles.

Foreign Military Digests

The foreign digests include "Tank Warfare—And Its Future" from *The Infantry Journal* (India); and "Holland's First Requirement: Preservation of Own Territory" from *Elsevier's Weekblad* (The Netherlands).

Books of Interest to the Military Reader

Reviews of *The Yenan Way* by Eudocio Ravines; and *Economy in the National Government* by Senator Paul H. Douglas are included.

Sea Power in the Next War

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The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

MANY people, among them even some of our leading thinkers, take almost as an article of faith the assertion that the day of sea power is over and that sea power will never again play a decisive role in war. In most cases this misconception is due to an uncritical acceptance of statements which sound convincing or stir the imagination, but which often cannot stand the test of critical examination.

To a great extent, this belittlement of sea power derives, of course, from the layman's lack of understanding of its real nature and function. Considering "sea power" as synonymous with "naval strength," or even equivalent to battleships and spectacular fights between fleets composed of them, the public is easily misled into discounting its value as a whole. For, it is argued, why spend tremendous sums for keeping up the largest navy in the world if battleships are rapidly superseded, if our prospective enemies have far inferior naval forces, and if the money is needed badly for other things? The argument sounds logical, but, being based on wrong premises, it is faulty and dangerous. Our need for sea power and for a navy is not predicated on the maritime strength of our opponent—except in a very general way—but on the function they have to perform.

Sea Power Defined

Before entering into a discussion of that function we must, therefore, define the meaning of sea power. Reduced to its simplest terms, sea power may be defined as the ability of one nation to make use of the sea lanes for the transportation of its goods and men, while denying them to its enemy. This ability requires certain composite elements, of which a navy is only one, its chief purpose being the safeguarding of sea lanes; it must gain and maintain the control of the seas. Another essential element of sea power is a merchant marine, which makes use of the waterways; without it, sea power would have no real meaning. The third element is bases, including not only places where ships and their crews can find shelter, facilities for repair, recreation, and refueling, but also harbors by means of which ships can communicate with the land, and in which sea power and land power meet, to exchange goods, men, and—

In view of our potential enemy's overwhelming land and air power, the only distinctive advantage we have over him lies in our sea power. It is the proper use of sea power that gives us hope of ultimate victory

in case of war—hostilities. Naturally, there are other factors needed to maintain sea power on a high level, such as industrial capacity or a sea-minded population; but for our purposes here it will suffice to consider only the first-named three in detail.

Defined in this way, the problems of sea power will exist as long as a single ship is left to ply the ocean, and, as far as anyone can foresee, that means for a long time to come. To speculate about a distant time when the seas will be empty of ships is perhaps an interesting but certainly an idle pastime, or, to paraphrase the German general Moltke, a dream and not even a beautiful one.

Sea Power in World War II

Sea power played an exceedingly important part in the last war; we never could have won without it. For while land and air forces made vital contributions to the final victory, they could not even have started to function without the aid of sea power, which transported them to the scene of action, prepared bases or landing places for them, and kept them supplied with the necessary equipment and supplies. In fact, considering the almost unbelievable problems that had to be solved, the tremendous obstacles that had to be overcome, the enormous populations, distances, quantities of supplies, and number of ships involved, it might well be called the war of sea power *par excellence*, the highest development in a long evolution.

The Question

Does that also mean that it represents the last link of the chain, the ultimate phase beyond which there is no further development?

To find a satisfactory answer to this question, and determine the role of sea power in a future war, we must begin by analyzing and deciding three preliminary issues which, while basic to our problem, are subject to much popular misconception. The first is this: Will the near future see a new type of warfare, radically different from that of the past, replacing the traditional reliance on the co-operation of all forms of national energy, of which sea power is an essential part? The second concerns the various forms of modern transportation which have, or will have, a determining influence on the conduct of a future war. The third issue is that of geographic location and its effect on warfare.

Air Power

One of the most widely accepted erroneous ideas concerning the waging of the war of tomorrow is that air power alone can win it. Being comparatively economical in the number of combatants it exposes to enemy action, and appealing strongly to the "mechanical-progress-mindedness" of the American people, the air power war seems to offer great advantages over the older forms of armed conflict. Its basic assumption is, of course, that an early aerial attack on the enemy, destroying his industrial capacity and terrorizing his population, will quickly break his ability and his will to fight and thus assure a speedy and cheap victory for us.

Campaign of Destruction

However, even if such a campaign of destruction could remain a one-sided undertaking—for which there are no indications—would it have the desired effect? At least three arguments suggest that it might not.

First of all, destruction, although a necessary ingredient of war and of victory, does not in itself guarantee or constitute victory. Moreover, it leaves such scars on the land of the enemy—and possibly also on his soul—that he may never recover from the experience. That, however, may mean that victory, even if it does come, creates more problems than it solves, jeopardizing everything that it is supposed to gain. In other words, such

a victory may win the war, but it will certainly lose the peace. Continued too long, and carried on too intensively, the air war against Germany actually undermined some of the allied political and economic objectives for postwar Europe.

Applying this theory to the conflict of the future, and assuming the Soviet Union to be our chief antagonist, we can visualize what might happen if we had only so-called "strategic air power" to throw against the enemy. The more we destroyed the industries of the USSR, the more we would force the Soviet armies to overrun the countries of Western Europe, where they could find replacements for their shattered productive equipment and thus continue to sustain their military power. We then would be faced with the necessity of bombing the cities and industrial plants of the invaded countries until nothing should be left to support the Communist war machine. Even if we could win the war that way, we would have laid the whole of Europe in ruins; its sad remnants would have been won over to Soviet communism, and few friends would be left for this country or for a democracy that permitted such destruction. Even early liberation could not heal the wounds; it might never be able to restore liberty and human dignity in the countries that once were our allies and the leaders of Western civilization. To kill people is bad; to kill entire nations is infinitely worse. And that might happen if we annihilated their productive capacity to a point where destruction would become militarily effective.

If today some of the countries exposed to that fate do not seem enthusiastic about defending themselves against threatening aggression, this is chiefly caused by the fact that until recently we could hold out no hope to them except that of liberating them by bombing them out of existence. It is obvious that such a prospect is neither pleasing nor reassuring to our friends and potential allies. What they really need and want is a demonstration that we are not only willing but able to help them *prevent* an invasion and the destruction attendant on it. Only then will they make the effort required of them to prepare their own defenses and take the risk that is implied in rearmament.

The only way we can give such a demonstration is to strengthen their own powers of resistance by sending to them large numbers of our own troops and enormous quantities of weapons and supplies, and that, as will be shown later, can only be done by the help of sea power. Even then, of course, destruction cannot be entirely avoided; but it can be minimized, and it will not leave the bitter taste of having been inflicted by a friend.

Air Distance

Another reason why it is doubtful that air power alone can win a war with the Soviet Union is the distance involved. If we have to bomb that country solely from bases in the United States, it will at best be a very inefficient and probably ineffective process. To fly from any point in this country to Moscow, for instance, and return, even if a great circle route across arctic regions is chosen, planes need a range of some 10,000 miles, while carrying a heavy load of bombs (see Figure 1). Besides, at such a distance, they cannot be accompanied by a fighter escort, with the result that few will arrive at their destination and fewer still will be able to bring their crews back alive. The only way to maintain that kind of warfare over a period of time would be to rely on suicide tactics, a procedure which seems peculiarly alien to the American mind.

There is a natural law which states that power is effective in an inverse ratio to the distance from its source; accuracy as well as the weight of bombs dropped over the target depend to a great extent on distance. If we have to carry on our aerial warfare from this country, only a small portion of the effort expended on it will be effective.

Intermediary Bases

If, on the other hand, we can launch our bombing missions from intermediary bases, points closer to the target than our own shores, we can use smaller planes of which we have many more; we can support the bombers by fighters and thus minimize losses. By flying from Iceland, for instance, the one-way distance could be cut down to 2,000 miles; from Spitzbergen it would be only 1,600 miles; Great Britain, France, Germany, Turkey, and Japan—any one of these countries would offer favorable bases for an aerial war with the Soviet Union.

That means that allies on the European and Asiatic Continents are essential to us if we wish to carry on an effective bombing campaign. However, to win and maintain those countries as our allies, we must be able to keep them free and alive, a task which can be accomplished only by sea power. If, however, we do possess such a ring of intermediary bases surrounding our potential opponent, we gain a double advantage, for, in addition to serving purposes of offense, they are also needed to detect and intercept the enemy's planes and missiles before they reach our shores, giving us time for proper countermeasures. The closer to his territory, and the farther away from ours we can find such points, the better we shall be able to reduce the effect of strategic bombing on our own land. In that case, we can say that we are closer to the USSR than the USSR is to us—a basic condition for success in aerial warfare.

A third argument against exclusive reliance on air power is that we have no particular advantage in that form of fighting over the Communists. We do not seem to have a decisive superiority in either the number of planes or their quality; we may be even more vulnerable to aerial bombing than the Soviet Union is, because of the greater concentration of our population in certain regions. Whatever we can do to the Soviet Union, she can also do to us, and we may in the end receive more damage than we give.

Recognizing these limitations on the ability of air power to win a war single-handed does not mean a lack of appreciation of the essential role it would play in any future conflict. Eventually, that role may easily prove decisive, but only if we cease to regard air power as a prima donna who can carry the show all by herself.

Push-Button Warfare

Among other popular favorites for winning a war quickly and with minimum cost to us is the so-called push-button warfare, in connection with the use of modern weapons of mass destruction, such as the atom bomb, and biological or chemical agents. With regard to reliance on push-button warfare in general, it may suffice here to refer to a recent statement made by Secretary of Defense Robert A. Lovett, in which he warns that there is "no new, inexpensive or magic way to win wars in the near future."

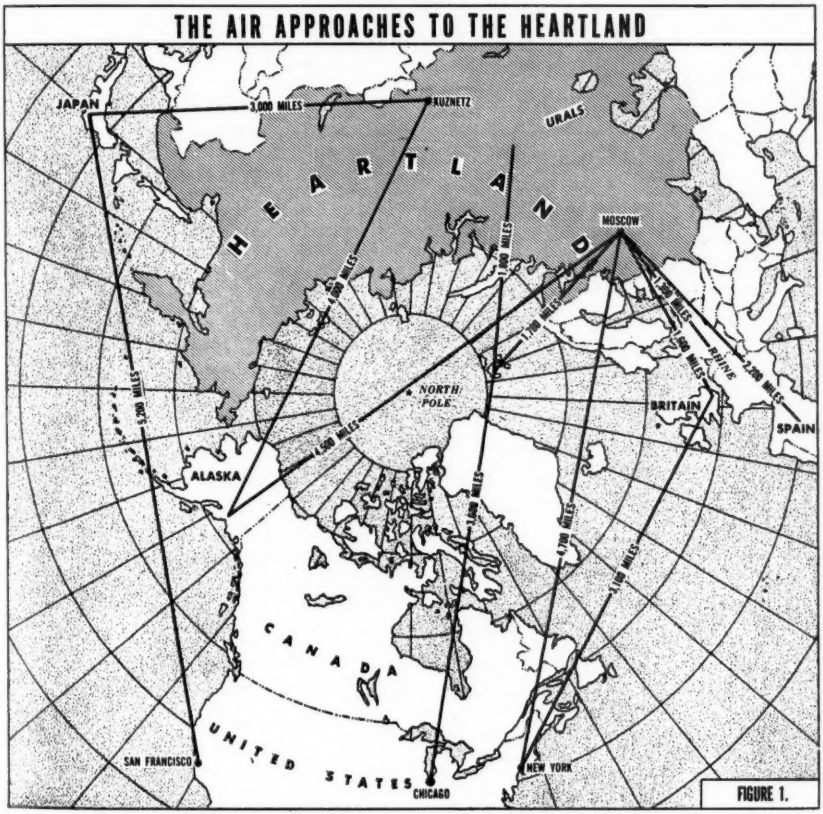
Super-Weapons

Moreover, as far as any of the super-weapons are concerned, it is doubtful if they will ever be used in a major war. Most probably they will be employed only if one side thinks it has a great advantage in such weapons over the other and is safe from retaliation. However, that is something hard to foresee. The Germans used poison gas in World War I, because they thought they had a monopoly of its production, but they did not use it in World War II, because, in the meantime, the other countries had caught up with them. That was also true of aerial bombing, in which at first the Germans had the start; but it soon turned against them and they got more than they had given.

Psychological Warfare

Another possible form of waging a mod-

ern war may be found in psychological warfare, which tries to undermine the enemy's will to fight. The employment of a "fifth column," the stirring up of dissatisfaction and unrest among the populations of the enemy country or of conquered territory, the organization of underground movements and sabotage from within, and the use of propaganda combined with modern means of communication—all these may prove formidable weapons indeed. However, while they may contribute to the enemy's downfall in the final stages of the war, when other means have already weakened him and prepared his defeat, such methods will scarcely be decisive by themselves, and cannot be relied on to win a war. Besides, they may easily prove to be two-edged swords and turn out to be as harmful to our side as to the enemy.



Weapons and Plans

While, naturally, every available and promising weapon must be considered, and while we must be prepared for their use, offensively and defensively, weapons cannot be made the sole basis of the strate-

gic plan. That which alone will win the war is—as it always has been and always will be—the proper combination and coordination of all aspects of national energy, such as diplomacy, economic power, industrial capacity, the sciences, psychology, plus the full employment of a "balanced force," that is, the team of all services used according to their inherent capability in common and comprehensive strategy.

Transportation

In order to come closer to an understanding of the capabilities inherent in each of the armed services, we must take a look at the one factor which, more than anything else, distinguishes them from each other: the particular mode of transportation which is basic to each one of them; for in the last analysis it is transportation which differentiates land power, sea power, and air power.

Air versus Water Transport

It is a matter of course that air transport—by plane or by missile—is the fastest form of locomotion so far developed. It has the added advantage of being comparatively independent of terrain; planes can fly anywhere and everywhere, over land and over sea, without the need of tracks or roads. However, they have one great drawback: because of their speed and their intricacy, they are enormously demanding of fuel and manpower.

Sea transport, on the other hand, being carried on in large units and at slow speeds, is the most economical mode of transportation. It is, of course, limited by the existence of water, and, although it is true that there is more than twice as much water as land on the globe, the fact remains that ships are stopped when they reach land, while planes can go right over it.

As an illustration of the comparative merits of the two systems, let us consider an example given by Secretary Lovett in 1944, when he was Assistant Secretary of War for Air. Because of this position, he cannot very well be accused of ignorance of the subject, or of any anti-air bias. The intervening 7 or 8 years have not changed the truth of his statements in the least, nor will there be any such change in the near future.

He stated:

> For some time to come, transport planes cannot, and will not, take the place of ships. There is, in fact, no good reason why they should. . . .
>
> Let us suppose that our problem is to move 100,000 long tons of supplies per month, under present wartime conditions, from San Francisco to Australia, a distance of approximately 6,500 nautical miles. How many planes of existing 4-engine cargo type will it take? How many cargo vessels will it take? How much personnel? Will we need tankers? And so forth. The following simple comparison will give the answers. (See Figure 2.)

Secretary Lovett continued:

> I believe a study of this comparison will indicate some of the absurdities of the recent "air cargo as a cure-all" excitement in the midst of a war in which we will need all the supplies we can get by land, by sea, and by air.

If we consider that a major war will pose dozens of similar problems, only of much greater magnitude, involving many millions of tons, we realize that no country, not even the richest one, could afford such expenditures in fuel and manpower for air transportation alone. Therefore, it is quite clear that the great bulk of all goods and men moved across land or across the sea will have to be moved by either land carriers or by ships. Air transport will, of course, play a most important role in all those cases where high speed is essential, or in places that are inaccessible to ships and railroads; one thinks of the Burma Road in World War II or the Berlin Airlift of more recent times. However, it will, for a long time to come, constitute a supplementary *express* service, not a substitute *freight* service.

Air Plus Water Transport

The best way, for military purposes, to combine the advantages of air and sea

transport, and to minimize their respective weaknesses, is the aircraft carrier. Enabling us to use the economical transportation of ships wherever it can be done, it also permits us to make full use of the great superiority of the plane when it is needed. Eventually, the aircraft carrier—as well as planes themselves—may be superseded by guided missiles and other new forms of locomotion. However, until then, the carrier represents the best compromise between sea and air transport, and gives the maritime powers a definite advantage over those nations which can fly planes from land bases only.

	Number	Crews	Fuel (barrels)	Tankers
Surface vessels (E C types)	44	3,200 (including gun crews)	165,000	none
Cargo planes (4-engine *C-87* type)	10,022	120,765 (flight crews only)	8,999,614 (oversea requirement)	85 (large size)

FIGURE 2.

Land Transport

Today's land transport system, including railroads and motor vehicles traveling on paved highways, is often superior in speed to transportation by ship. This is quite in contrast to conditions a hundred years ago, when land transport was slow and cumbersome as compared with maritime transport, especially if it involved the moving of heavy goods. Given an interior position, a land power, taking advantage of this new superiority of land transportation, can usually reach places within a certain distance from its center more quickly than a sea power which must rely on slow ships and may have long ocean lanes to traverse.

'Round-the-Seas-Plan'

It was this consideration which led the German geopoliticians to the conception of the so-called "Round-the-Seas-Plan" that was to help them to neutralize the threat of British sea power in World War II. Not possessing a navy powerful enough to challenge British command of the sea directly, the Germans had to try to find a way to prevent British sea power from becoming fully effective, as it had been in World War I. Since the surest and quickest method of reducing the enemy's sea power—the destruction or elimination of his naval forces—was denied to them, they devised a scheme that would produce similar results, but which would concentrate on the other two essential elements of sea power, shipping and bases.

Consequently, the direct attack on allied shipping, chiefly by U-boats, was revived from World War I, but another method, not previously tried by the Germans, was added: the capture of all continental ports and harbors through which British sea power might make itself felt, by which sea-borne aid might reach continental allies to reinforce their resistance and put pressure on the German conqueror.

Therefore, in World War II, the German High Command, instead of aiming at the quick capture of Paris—the main goal of German strategy in the preceding conflict—systematically went about capturing the European coast, from northern Norway all the way down to southern France, and through most of the Mediterranean. In addition to minimizing the ef-

fect of British naval superiority, this move also gave the Germans the advantage of better bases for their submarine offensive.

For a while it looked as if the plan might work. Enjoying the advantage of interior lines and superior land power, the Germans could strike with lightning speed in any direction. Within a radius of some 1,000 miles, which includes all of Central, Western, and Southern Europe, they proved themselves supreme; all countries within the magic circle either fell quickly to the conquering German armies, or allied themselves with the victor, leaving him in control not only of their resources but also of their harbors. Thereafter, neither British military reinforcements nor supplies could reach the Continent, precluding any hope that the victims of German aggression could reorganize their own forces for a counteroffensive. Only a forceful invasion could reopen the Continent and carry the war to Germany herself, but for such an undertaking British power by itself was entirely inadequate.

Contributing Factors to Failure

If the "Round-the-Seas-Plan" did not, in the end, succeed, three factors were chiefly responsible: First, the Italians were unable to accomplish their part of the plan, which consisted of taking the Suez Canal and Malta, or defeating the British Mediterranean fleets; nor did Spain do her share, which was the capture of Gibraltar, needed in order to close the "Middle Sea" to allied sea power.

The second factor was the addition of United States power to that of Great Britain, which tipped the balance in favor of the allies and eventually made possible the invasion of the European Continent.

The third reason for the failure of the German plan had to do with the problem of transportation and hence must be elaborated here. It is, of course, quite true that land transport nowadays has certain advantages over maritime transport. However, this is true only within definite limits. For instance, the superiority holds only in a region which, like Western Europe, possesses a highly developed system of railroads and highways. Besides, land transportation quickly bogs down if it meets natural obstacles, such as high mountain ranges, deserts, or large bodies of water. Furthermore, it has a range limit beyond which it tends to deteriorate, even under the most favorable conditions. This range may be assumed to be somewhere between 1,000 and 1,500 miles, when the law of diminishing returns begins to operate and to call a halt to major operations. The Germans felt keenly the effect of that law in the vast expanse of Russia and in North Africa, in both of which theaters they had overextended their lines of communication. This proved to be one of the main reasons for their eventual defeat in those areas.

Range of Water Transport

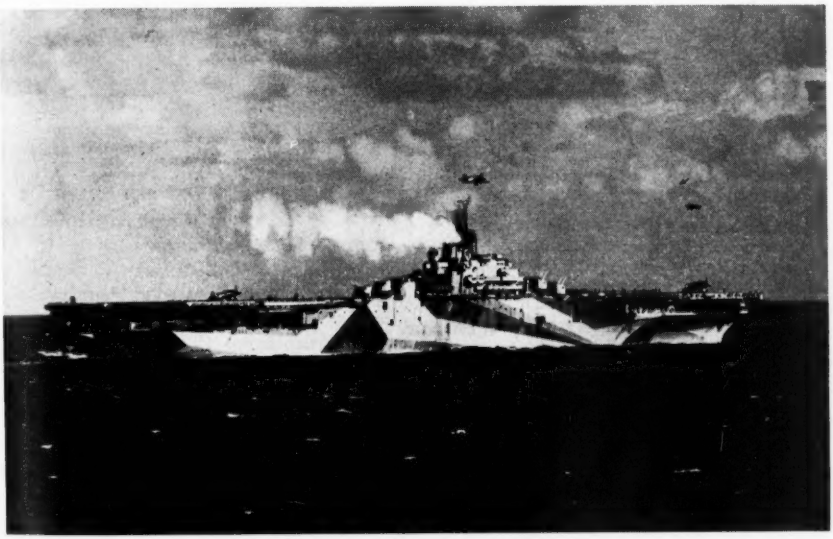
In contrast to this, ship transportation, slow to begin with, has no such narrow limitation of range. A modern merchant ship can go 10,000 miles almost as easily as 1,000 miles; it only takes longer. Therefore, British sea power, even though it had to operate partly along the detour around Africa to reach Egypt, slowly but inexorably built up resistance and strength, until these more than equalled German power in the desert which, lacking contact with Germany herself, faced an almost insurmountable problem in logistics. Even good generalship cannot entirely overcome such a handicap; hence the eventual German collapse after an initially brilliant campaign.

The mistake of the geopoliticians has been to generalize conditions found within the comparatively limited confines of Europe. However, these conditions, which favor land transportation over its maritime counterpart, are rarely found outside of that small continent and the United States. In a war of global proportions,

ship transportation—or sea power—would still afford a degree of mobility superior in many ways to that of a large land power.

Korean Conflict

If factual proof is wanted to back the logic of these deductions, we need only look at the situation in Korea. First of all, the Korean campaign has demonstrated beyond doubt that wars cannot as yet be won by air power alone, even if one side has a decided superiority in it over the other. Second, without a base nearby—in this case Japan—from which troops could be thrown into the fight quickly, Korea could never have been held against the assault of Communist forces which had only to cross an imaginary border behind which they had carefully prepared for the invasion. Third, however, as soon as the situation was somewhat stabilized, the logistics problem—primarily one of transportation—became of primary importance. Despite short overland communication lines, the Communists have no particular advantage in this respect, because their land transportation system is not highly developed and because a part of their equipment, coming from European Russia, must cover long distances before it reaches the front lines. Even though our ships have to go more than 6,000 miles to keep our armies in Korea supplied, we seem to have suffered no adversity on that account. Finally, anyone looking at the grim spectacle presented by the liberated parts of Korea can understand that people will not put their whole heart into measures of defense unless they see a reasonable chance of preventing invasion rather than merely assuring "liberation."



Aircraft carriers serve as mobile advance bases and as such are likely to play a significant role in a future war even against a land power.—Department of Defense photo.

To be sure, some of the proponents of air power or of push-button warfare will point out that the Korean conflict does not represent a typical theater for the proper display of their capabilities. However, can we ever be sure that the next war

will offer these particular conditions of which the air enthusiasts are thinking? There is, of course, always the danger that we prepare for the war of yesterday which will never be repeated. There is, however, an equal danger that we now prepare for a war that is too far in the future and are caught unprepared for the struggle of tomorrow and the day after. To be safe, we must prepare for a wide range of types of warfare, for war always seems to turn out to be different from what it was expected to be. Or, as the President's Advisory Commission on Universal Military Training so aptly expresses it:

> The peace-loving nation has no choice except to prepare for every type of attack that might be launched against it and from any possible source. If it leaves any avenue unguarded, it must expect an alert and skillful aggressor to take advantage of that blind spot in its defenses. The omission could prove fatal.

Geographic Position

The third issue that must be settled before we can come to a proper appreciation of sea power's future role is the relative geographic position of the potential antagonists. A glance at the map shows that the Soviet Union and her satellites enjoy a more or less central position within the vast double continent called Eurasia (see Figure 3). This location, similar to that of Germany within the narrower confines of Europe alone, gives the Soviets a great ostensible advantage. Coupling the partial superiority of land transportation with a strong military striking power, the Soviet Union can reach out in almost every direction and overrun the coastal regions of the Continent in a comparatively short time—if it finds no resistance. Quickly and efficiently executed, such a "Round-the-Seas-Plan" on a larger scale would place the greater part of the world's population, highly developed industries, and rich sources of raw materials under Soviet domination.

The Heartland Theory

This favorable position inspired the British geographer Mackinder to his now famous statement that whoever controlled the "heartland" (the central part of Eurasia) would soon also dominate the "world island," meaning the land mass of Europe, Asia, and Africa. And whoever utilized the enormous resources of this vast territory could build up his sea power and general strength to a point where he could successfully reach out for world domination by conquering the remaining continents, the insular Americas and Australia.

Position Is Relative

The theory sounds ominous, and there is, unfortunately, much truth in it. Actually, however, things are not quite so simple. Position is always relative; if it can be said that central location has certain advantages, it can be maintained with equal justification that peripheral location offers definite benefits, because it allows concentrated and co-ordinated attacks on the country in the middle. Germany, despite her interior lines, was defeated when the allies, encircling her, became strong enough to open a second and third front, thus pressing her from all sides. Every advantage inherently contains a weakness, one turning into the other according to the combination of circumstances.

Size—Asset or Liability?

For instance, one of the Soviet Union's greatest assets from a military point of view is her great size, which enables her to trade space for time and causes the attacker to overextend his lines of communication. However, this very size, which saved Russia from an invader twice within the last 150 years, has its defects. One is the difficulty of transportation, among the worst bottlenecks in the Soviet Union's war potential; the other is the inability to protect all of her enormous frontier lines adequately. If the USSR

were attacked simultaneously from more than one direction, weak spots could be found in her armor, and the ability of her armies to withdraw into the interior would be definitely limited. However, only with the help of sea power could the offers or prepare to overcome the obstacles which it puts in our way. However, we do not need to accept those conditions as final and unalterable. If geographic conditions alone decided the issue, the United States could never have won

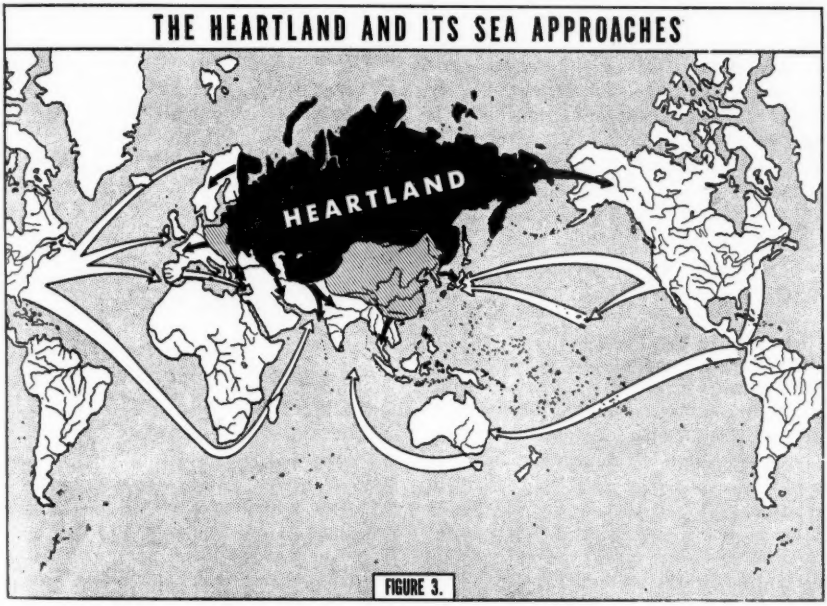


FIGURE 3.

France of 1812 or the Germany of 1941 launch such centripetal attacks, and neither had it in sufficient measure.

Man Decides the Issue

Moreover, for all of the enormous importance of natural conditions, one must not fall into the error of assuming that they are decisive in themselves. Mackinder himself rejected geographic determinism, as indicated by his statement that "man and not nature initiates." Despite the fundamental influence of geography on the conduct of war, we must still realize that it only determines conditions, not outcomes, which depend primarily on our actions. Being aware of geographic reality, we can either take full advantage of any benefits it the war with Japan, in which practically all geographic circumstances were unfavorable to us.

However, the study of geography can still teach us most valuable lessons. Among others, it shows that the Soviet Union, the pivotal state of Eurasia, can reach virtually all her primary objectives—assuming them to be the domination of the whole of Eurasia—by expansion over land alone. Merely by spreading out into neighboring regions, she can extend her control until she engulfs the entire "rimland" of the double continent. Because of central position and the predominance of short land communications, the USSR can achieve this without the need of sea power.

If, on the other hand, the United States wishes to put a stop to Communist expansion and conquest, if we want to aid our allies and properly defend this country from attacks, we must cross the ocean to reach the Eurasian Continent and carry the war against the aggressor. Whatever we do, unless we give up entirely, we must cover long distances by water—and that clearly and unequivocally implies the use of sea power. No other conclusion is possible. Without the smooth operation of sea power, our land power cannot begin to function, and even our air power will be seriously reduced in its effectiveness. This condition has not changed greatly since the last war, after all.

The Basic Difference

The real basic difference between the two antagonists is, therefore, that the Communists can win the war essentially without the help of sea power, while we cannot. This is a fundamental condition which exists regardless of numerical strength, industrial capacity, or wealth in natural resources. We can then define the Soviet Union as being principally a land power, irrespective of her naval strength, while the United States is—and must be—basically a sea power. To be realistic and successful, our strategic plan must be built on this foundation, must take full advantage of whatever benefits this bestows upon us, and must prepare beforehand to overcome whatever handicaps it involves. Moreover, since sea power is of such enormous importance to us, our plan also must provide for the best measures to protect it and assure its unremitting functioning.

Findings

Before drawing further conclusions from these preliminary considerations, we may now recapitulate our findings:

1. It is more than doubtful that air power alone, a push-button type of warfare, the atom bomb, or any other single factor which we can envisage at present can win a war in the near future. The only safe way of preparing for all eventualities is to continue the development of all constituents of national power, and to gain allies and help them strengthen their own powers of resistance. This can only be done with the help of sea power.

2. The immense logistic problem which would confront us in case of a major war can be solved only with the help of sea power.

3. Geographic conditions demonstrate unmistakably that, while the Soviet Union can dispense with sea power on a large scale—except negatively, by attacking ours—this country is absolutely dependent on sea power and cannot win a war with the USSR without its help.

First Safety Belt

The first conclusion that we may draw from these premises is that we can distinguish three natural belts or spheres of defense, each of which poses different security problems and requires different defensive measures. The first belt is composed of the direct neighbors of the Soviet Union or her satellites, such as Finland, Sweden, northern Norway, West Germany, Austria, Italy, Yugoslavia, Turkey, Iran, Iraq, Afghanistan, northern India, Indochina, and Korea. With regard to this ring of countries, Soviet land power has a pronounced lead over us, especially in view of the fact that it holds not only the interior position, but also the great advantage of unified organization and command.

The answer to this is not, of course, that we must passively accept our inferiority and look on helplessly while one country after another in this belt is drowned in a Communist deluge; instead, we must see to it that within that sphere preparations to withstand aggression are started early, well in advance of the outbreak of hostilities. Once an actual hot war breaks out, we have little chance of reaching any of these countries before the

Communists do—unless their own power of resistance is well enough developed to withstand the first assault and thus gain time. The main defense problem in this first belt of resistance is, therefore, promptly to develop the land power of those countries and to co-ordinate their efforts, politically and economically as well as militarily, so as to enable them to resist invasion, or, still better, to prevent it entirely. All that sea power can do in this situation is to keep reinforcements and supplies flowing to the threatened regions. That is of utmost importance, but by itself it cannot stop or prevent invasion. Moreover, while the loss of any part of this inner rim would constitute a major defeat for the United States, such losses cannot be avoided entirely and would not necessarily be fatal. The main objective would be to keep so large a portion of it out of Communist hands as to provide a sufficiently broad basis for eventual counteroffensives. That is essential, because the next war may not again offer an opportunity for a Normandy invasion or its equivalent.

Second Safety Belt

The second safety belt is composed of the countries of the "outer rim," or the continental fringe of the Eurasian land mass. This sphere lies outside the immediate grasp of Soviet land power, being protected from it either by high mountain ranges, deserts, the sea, or long distances. It includes, possibly, Spitzbergen, but certainly Iceland, Great Britain, Spain, North Africa, Arabia, southern India, parts of Southeast Asia, Indonesia, the Philippines, Formosa, and Japan. The loss of any part of this second defensive belt might prove fatal to us. However, in contrast to the inner rim, this fringe can be held and defended by sea power, that of our allies and our own. Unless we are caught napping and unprepared, we need not lose any of it. It is this region which is our natural staging area, where we can build up stock piles of weapons and supplies, because here they are safer from capture than in the territory of the Soviet Union's immediate neighbors. To this region we must withdraw in case we are pushed out of any part of the first belt, to continue the war and prepare our counterblows.

While early preparation is not quite as important in this area as it is in the inner rim, its essential value to us also calls for prompt precautionary measures at this time. They must include the building of airfields, the enlargement of harbors to handle the increased wartime traffic, the construction of shelters, warning systems, barracks and storage places, and antiair and antisubmarine defenses. The land forces of this outer ring, so far as they are not needed for the repulsion of airborne attacks, could best be used to reinforce our allies on the Continent, as there is almost no chance of any large-scale invasion of these countries—at least during the early stages of the war—as long as our sea power is unimpaired.

Third Safety Belt

The third belt consists, of course, of the insular continents, the Americas and Australia, and southern Africa. Being, for the most part, completely out of reach of the Soviet Union's land or sea power, defensive measures here can, on the whole, be concentrated on the best available devices against attacks by planes and guided missiles. That, however, is by no means a small or negligible task. For although the frequency and effectiveness of such attacks will not be great on account of the distance involved, the United States is, after all, the most important target in any major war, and will, therefore, receive primary attention. In Europe, the Soviet leaders may be very careful of what they destroy, because they would rather make use of captured productive capacity for their own purposes; there will be no such reluctance about damaging American cities or plants.

A National Security Policy

On the basis of these reflections, it may now be possible to arrive at an over-all American national policy, which will offer the highest degree of security obtainable for our country at this time. As emphasized throughout the preceding pages, such a policy must take into account the capabilities as well as the essential needs of sea power. It must and can do so without sacrificing similar needs of the other services, because they are mutually supplementary; neither can succeed without the help of the other, while conditions favorable to one are generally also useful to the others. As a team in which each part performs that task for which it is best suited, they will achieve their purpose; reliance on any one part alone to do the entire work is contrary to logic, disregards lessons of experience, and invites disaster.

The general lines of the national strategy that is needed today, American in inception and motivation, but global in conception and execution, are, of course, well understood and more or less generally accepted. Our national strategy aims at the strengthening of our own position and that of our allies everywhere and in every respect, politically, economically, and militarily. It has led to the successive measures of rearmament and foreign aid, the Marshall Plan, the North Atlantic Pact, the promotion of European unity and a common European army, the generous peace treaty with Japan, and the concomitant mutual aid treaties with our potential Pacific allies. These and similar moves are needed and bring us closer to either of the two aspects of security; security from war, which prevents an armed conflict; and security in war, which tries to create a situation that offers the best chance of victory once the conflict has started.

However, we are concerned here primarily with those national policies and actions which bear more directly on the role of sea power within the framework of the defensive team—or, more specifically, with the question of what needs to be done to make certain that our sea power will be adequate to the tasks awaiting it in the conflict of the future.

Generally speaking, these needs are also rather obvious: strengthen, in every way possible, the individual elements of sea power, the Navy as well as the merchant marine, and provide, at the earliest possible moment, the bases necessary to assure the highest degree of efficiency for the other two elements of the armed forces. This involves not only material but also intellectual preparation, public enlightenment as to the role and intrinsic value of sea power, and a careful study of its possibilities as well as its limitations. As emphasized repeatedly in this article, it naturally requires the co-operation of all other parts of national power, which presupposes a better mutual understanding of the problems involved. As a typical example of such co-operation, let us consider the subject of the defense against submarines in a war with the Soviet Union.

Sea Power and Strategy

Knowing the advantages which sea power bestows upon us, it is to the vital interest of our potential enemy to keep us from enjoying them. He will try to do so by destroying or capturing our ports of embarkation and debarkation—bases, generally speaking—and by attacking our ships along the sea lanes by means of planes and submarines. To defend ourselves against this latter threat, we can either hunt down each submarine individually all over the world's oceans, which is the most wasteful and inefficient way of fighting them, or we can try to deny them access to the oceans where they might do damage to our shipping, which is a much more effective method. With regard to the Soviet Union, the three strategic points where that could be done—

except in Communist-held ports—are the straits through which their submarines have to pass to reach the ocean: the Kattegat, between Norway and Denmark; the Dardanelles; and the Bering Strait. If American diplomacy, backed by economic and military power, will assure us the inclusion of the first two in our peacetime alignment, and their successful defense in time of war, sea power could easily save a thousand submarine chasers of various types and millions of dollars which could be spent on some more urgently needed projects.

Sea Power and Diplomacy

That a strong sea power, on the other hand, tends to strengthen the hands of our diplomats and help our land and air power achieve their respective goals ought to be evident by now. Without the mobility granted us by our sea power, countries such as Greece, Turkey, Japan, and Formosa could not have been kept out of the Communists' grasp.

Preparation of Bases Abroad

Among the more specifically military measures required to prepare our sea power for its role in any future conflict is, as mentioned before, the provision of bases abroad. The magnitude of this task alone becomes apparent from a statement made in 1945 by H. Struve Hensel, then Assistant Secretary of the Navy. According to him, the United States, commencing in 1940, built 434 war bases of various dimensions in the three main theaters of war. That this is primarily a function of sea power is indicated by the fact that to construct a single air strip for the use of the *B-36* type bomber, 20 shiploads of cement are required. Moreover, that such an enormous undertaking cannot be left entirely until the outbreak of hostilities should be rather evident.

Another essential step in the same direction is, of course, the expansion and rejuvenation of our naval forces. Sometimes the argument is heard that this is unnecessary because our potential opponent does not possess a strong surface fleet. Such reasoning is completely erroneous, as the size of a navy does not depend on that of any prospective enemy alone, but on the tasks it has to perform. With duties awaiting it in virtually every nook and corner of the globe, our Navy can never be too strong, regardless of the strength of the Soviet Navy.

On the whole, our Navy is probably well equipped for its mission. It will certainly find use for all its ships, planes, weapons, and special skills. Its battleships, aircraft carriers, cruisers, and destroyers will be employed in guarding our convoys, in destroying or softening up hostile shore installations, fighting the enemy's naval forces, and supplying support for amphibious landings, if they should become necessary. Its mine vessels will be needed in the war of mines, in which the Soviets always have shown great proficiency. Its small craft will have a thousand different uses, so that their number never will be sufficient. However, there also will be an urgent need for special vessels, such as ships equipped to operate in arctic waters, coast assault vessels, guided-missile ships, new types of submarines and submarine chasers, and many others. The more of this need we can anticipate now, the better we will be prepared later.

Larger Carriers for Heavier Aircraft

A specially pressing need is one for newer and larger aircraft carriers to operate larger and heavier aircraft. These must be provided in addition to land bases, for while such bases have the great advantage of being unsinkable, they suffer from the fact that they are immovable. Hence, they cannot escape attacks by dodging or dispersing, as fast carriers can. Moreover, the location of these land bases being fixed, they cannot vary greatly the routes along which they launch their attacks,

with the result that the enemy can concentrate his defenses along these probable routes. Besides, air strips on land can be taken by land forces, and then used against us. Finally, having at our disposal a sufficiently large force of aircraft carriers, we can strike our blows in regions where we have no land bases or before they can be made ready there. We can thus add considerably to the striking power of our Air Force. In some cases, ship-borne planes may be the only means to harass an invader and keep him from consolidating his gains, give tactical support to our troops, or help in ferrying paratroopers to their destination.

Faster Merchant Ships Needed

In the same way as our Navy, our present merchant marine probably comes close to being adequate to the demands of a war in the near future, that is, as far as overall tonnage is concerned. However, from what has been said about the great value of speed in the race between land and sea transportation that will characterize the next war, it is evident that we must have more fast troop transports, cargo ships, and tankers. Moreover a sufficient number of these must be ready and available to go into action at the shortest notice, to carry troops and supplies anywhere across the seas. However, we must not put off the construction of such ships to the outbreak of hostilities, for by then it will be far too late for them to do what they are supposed to do. The need for such fast ships does not, of course, preclude the necessity of also having a force of transport planes to serve as forerunners whenever and wherever speed is the predominant consideration.

Expanded Marine Corps Needed

However, these ships and planes will be of little use unless we also have available a striking land force of sufficient strength, highly trained and properly equipped, ready to be thrown, at a moment's warning, into any of the places that might be threatened by Communist expansion. The chief purpose of this force would be either to brace local military resistance, or occupy and hold endangered spots until regular units could arrive and take over, for it must be remembered that it is better and easier to occupy and defend a place than to dislodge the enemy from it. It seems likely that this force of "minute men" could best be provided by a considerably expanded Marine Corps.

No argument is needed to point out the necessity of having at our disposal a competent, hard-hitting Air Force, nor an Army large enough and equipped with the most effective weapons, to enable them to fulfill their respective vital missions in the war of the future. Nor will anyone doubt that we also must have an industrial production geared to global demands, a firm conviction in the inherent virtue of our ideals, and a bold foreign policy which anticipates needs instead of waiting for the opponent's moves.

However, to assure our success in the next war—if it ever should come—two factors need special emphasis. The first is speed of action in peacetime preparation and wartime execution. If General Forrest's well-known dictum was ever true, it certainly is in the present situation.

The other is this: In view of our potential enemy's overwhelming land power, and possibly also air power, the only distinctive advantage we have over him lies in our sea power, our ability to use the oceans for our purposes. This advantage we must recognize and press to the utmost in order to overcome our handicaps. It is the proper use of our sea power that gives us the hope of ultimate success and victory.

Who Dictates Destruction?

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The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

HITLER'S "flying court martial," with its organic execution squad, convicted five officers, and shot them shortly after the Remagen Bridge was captured by the 9th Armored Division.

Was the bridge captured because a Nazi engineer colonel and a general staff major were negligent in the performance of duty? Or was it captured because the German Army's doctrine for destruction was faulty?

Evidence exists that both questions could be answered affirmatively, for there was no prepared demolition plan at the bridge; the bridge garrison was inadequate; communications apparently were nonexistent; there was no liaison between responsible parties; there was no co-ordinated scheme for the withdrawal over the Rhine; and the technical preparations as regards circuits, priming, and quality of explosives were questionable.

It is simple for us to criticize a defeated and demoralized enemy army, but we must be alert to the possibility of similar shortcomings existing in our own Army. Moreover, at the present time, we do have doctrinal vacuums which could have consequences more disastrous to us than the Remagen bridgehead was to the Germans.

The Problem

Current doctrine does not answer the questions, "Who initiates the plan and who gives the order to blow the bridge, the underground mine, the chemical plant, the shipyard, or the dam?" Further, existing doctrine does not even suggest an answer to, "How do we make sure that only one commander is planning to destroy the bridge?" or, more important, "How do we ensure that the commander with primary interest will actually initiate the order?" Our problem, then, is to answer these questions by proposing a doctrine that will fill the existing vacuum.

Defensive Concept

It is a well accepted fact that the United States will be forced to adopt a strategic defensive in the early stages of a future war. In a theater of operations, the execution of a strategic defensive may involve the conduct of a denial operation, a tactical defensive operation, and a delaying action—all of which will involve widespread destruction.

A short explanation of the scope of a denial operation and a barrier system (both the tactical defensive and delaying action dictate the employment of barriers)

A firm policy must be developed for the planning, preparation, and execution of the destruction of those installations having both strategic and tactical significance if we are to avoid an 'American Remagen'

will assist in clarifying the problem under discussion.

A Denial Operation

A denial operation is one which, by removal or destruction, prevents the capture and use of anything in an area of operations by the enemy. It is basically strategic in concept. The denial policy for a theater may be established by congressional or Presidential authority.

The extent of denial may vary greatly. At one extreme is the "scorched earth policy" in which an entire region is rendered useless to the enemy. Sherman's "March to the Sea," in 1864, exemplifies this type of extreme denial operation. His special squads of foragers or "bummers," as they were commonly called, took what they could carry and destroyed the rest.

A partial or limited denial operation is one which falls short of the scorched earth policy. Such an operation might include whole or partial destruction of all petroleum refineries, pipe lines, storage tank farms, steel mills, jet engine manufacturing plants, radio broadcasting stations, telephone central switchboards, hydroelectric plants, highway and railway bridges over major rivers, and railway lines.

Operation *Bugout*, the unofficial name of the United Nations withdrawal from the Yalu River in Korea in December 1950, is illustrative of a limited denial operation. Here, demolitions were executed not only to delay the enemy but to destroy equipment and supplies of military value to the enemy. Legitimate targets for demolition were telegraph, telephone, and radio installations; dock facilities; and military supplies of all kinds, including food. Forbidden demolition targets were utility installations such as power plants and water supply systems which serve civilian centers, buildings used as dwellings, and foodstuffs in the hands of individuals. Briefly, then, destruction for destruction's sake was not tolerated—the objective of the destruction was simply to combine maximum damage to the enemy with minimum harm to the civilian population.

A Barrier System

The destructive work which is required to carry out the previously described denial operation must not be confused with that which is required to prepare a barrier system.* A barrier system is tactical in nature. It consists of barriers or bands of natural and artificial obstacles designed to stop, hinder, or divert enemy movement. Barrier planning is initiated at army level. It continues at all subordinate levels, for the barrier plan must be closely tied to the tactical plan at each level.

Artificial obstacles serve to strengthen natural barriers. The creation of these obstacles requires either destruction or construction work. We are considering only the destructive works. Both the denial operation and the barrier system, therefore, involve extensive destruction. Both may require destruction of the same facility. Why is this so? Essentially there is an overlapping of objectives in the two plans, however, the question can best be answered by illustration.

A large dam located in a corps sector provides water for power, irrigation, and industrial use throughout a large area. As such, it is of strategic importance to the theater commander, and most certainly will be marked for destruction in his denial plan. On the other hand, if the dam is destroyed immediately, it will flood a large area and hamper corps operations. However, if blown subsequently, and when desired by the corps commander, it may be incorporated in the corps barrier system, and present a formidable obstacle to the advance of the enemy. Thus, the dam has both tactical and strategic significance.

* A barrier system is a series of related barriers whereas a barrier plan serves to integrate barriers and obstacles, both natural and artificial, into a barrier system.

This illustration points up the fact that where destruction of a facility is subject to the inclusion in both a denial plan and a barrier plan, a clear-cut line of responsibility for the planning, preparation, and execution of destruction must exist.

Responsibility

Tactical destructive work—that which is of interest to the tactical commander in accomplishing his mission—normally will be included in the barrier plan of the tactical commander. The responsibility for planning and executing this work must flow through command channels.

Responsibility for carrying out a denial plan and its resulting strategic destructive work is not so simple and straightforward. Several reasons for this condition are apparent.

Certain items marked for destruction under the denial plan may be of such overwhelming importance to the theater commander's mission that he is unwilling to delegate responsibility. As an example, the highway and railway bridges crossing the Mississippi River at Memphis are of great importance. A theater commander would be willing to isolate some of his troops, perhaps a regiment, on the enemy side of the river, rather than risk capture of the bridge by the enemy. Whereas, a division commander responsible for destroying the bridges would consider blowing them only after his entire division was safely across. This would entail risks that could easily result in an "American Remagen."

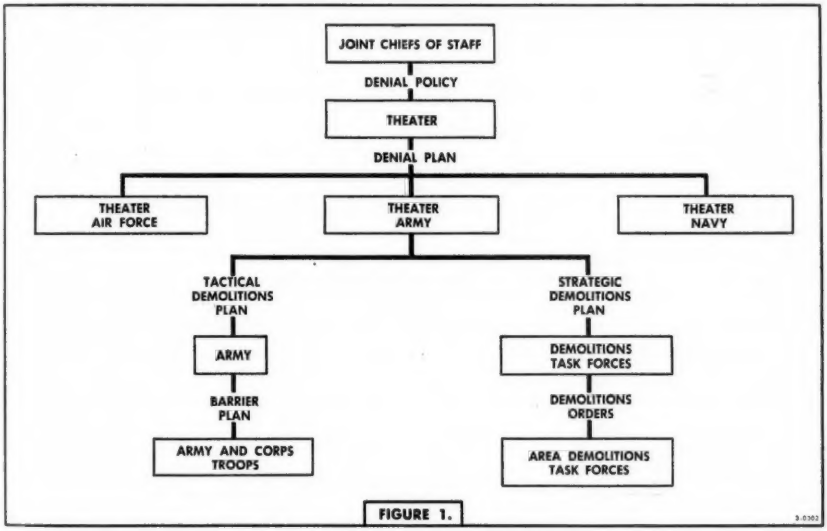

FIGURE 1.

Another consideration is the adequacy of communications from theater headquarters to the individual facilities to be destroyed. Where communication is not dependable, responsibility for destruction must be delegated to area commanders.

As a final consideration, where destruction is highly technical in nature, or where the denial policy requires only very limited or disabling destruction, expert advice is required. Qualified technicians are not found at each level of command, and, therefore, the execution of a denial plan should not follow direct command channels.

Solution to the Problem

There are essentially three methods of controlling the execution of strategic destructive works and ensuring their effective integration with tactical destructive work. These three methods are:

1. Demolition task force method.
2. Technical demolition team method.
3. Functional demolition method.

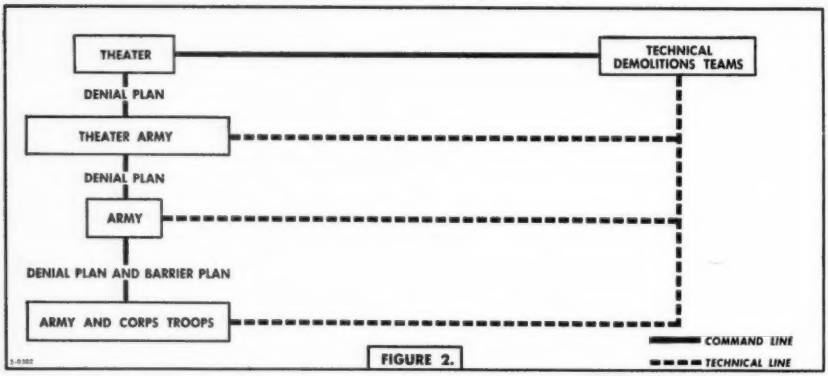

FIGURE 2.

Demolition Task Forces

Essentially the demolition task force method involves the execution of all strategic destruction directly under theater control (see Figure 1). The work will be performed by demolition task forces composed of engineer troops, or friendly civilians working under military supervision.

With this method, all tactical destruction, even though some of it may be included in the theater denial plan, will be executed by and under the control of the tactical commander.

For this method to work, the theater denial plan must be subdivided into two separate plans, the tactical demolitions plan and the strategic demolitions plan!

The tactical demolitions plan will list facilities which must be denied the enemy, but which are also of significance to the tactical commander. Works of destruction included in this plan will be integrated into the barrier plan at army level.

The strategic demolitions plan will list facilities which must be denied the enemy, but which are not of primary interest to the tactical commander. The required destructive work will be performed by demolition task forces operating under theater control.

Here is an example of how the method will work. A railroad and a locomotive works are located in the area of a field army. Both are scheduled for destruction in the theater denial plan. However, the railroad, which runs perpendicular to the front, is being used to stock army supply points which will be used to support successive delaying positions. The army commander desires to use the railroad as long as possible; however, he has no interest in the locomotive works, because he has sufficient operational rolling stock.

The locomotive works will be included in the strategic demolitions plan, and probably will be assigned to a task force of platoon size for the preparation of demolitions. The order actually to detonate the charges would originate at theater.

The railroad, primarily the bridges and some trackage, would be listed for destruction in the tactical demolitions plan. These items then would be included in the barrier plan of the army. Destruction actually would be performed by army, corps, or divisional troops as the retrograde action proceeded.

It can be seen that in this method the commander with primary interest directs the preparation and execution of demolitions, and that there is no overlapping of responsibility.

Technical Demolition Teams

In this second method, responsibility for executing the theater denial plan will pass through command channels (see Figure 2). In other words, the tactical commander will have the responsibility for strategic destruction as well as tactical destruction in his area. Assistance in carrying out the technical aspects of this responsibility can be obtained from theater when desired. Included on the theater staff will be a pool of technical demolition teams. Members of the teams will be trained to effect maximum destruction of highly technical industrial plants with the minimum expenditure of effort. Teams will be attached to subordinate commands to assist in the destruction of specific installations. Just why these teams are needed and how they can best be utilized is shown in the following example.

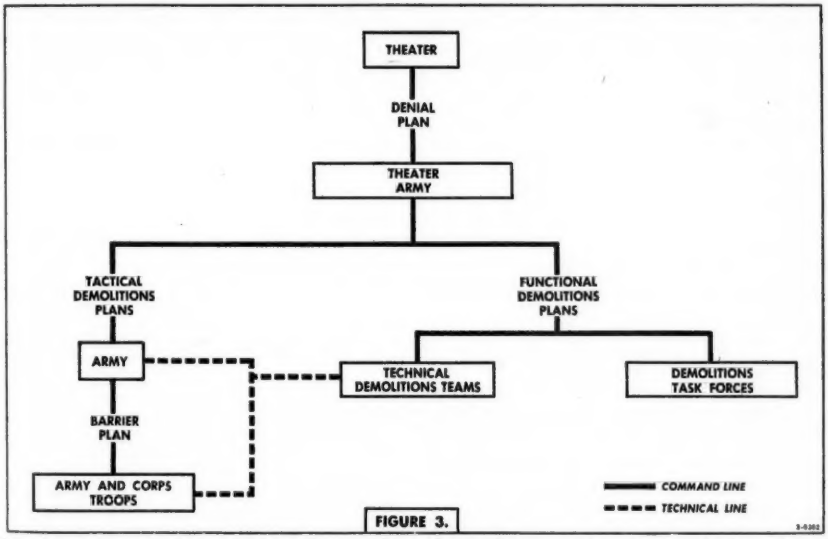

FIGURE 3.

A large petroleum refinery is located in a regimental sector. In furtherance of the theater denial plan, the regiment has been made responsible for limited destruction of the refinery; it is to be rendered useless for a period of 6 months.

A company of combat engineers is attached to the regiment. The company commander is given the mission of putting the refinery out of commission for 6 months. He makes a preliminary reconnaissance through acres of fractionating columns, steel tanks, pump stations, and furnaces. In talking to a native, he finds that it took 2 years to build the refinery. Therefore, he concludes that he should destroy one-fourth of everything he sees. After a few rough estimates, he concludes that it will take his entire company 4 days and 10 tons of explosives to do the job.

Upon getting this estimate, the regimental commander immediately requests that the division get him a refinery demolition team from theater. The team sent was composed of an experienced chemical engineer, a former refinery foreman, and a former quarry foreman.

With one squad of men from the engineer company and 200 pounds of explosives, the required destruction was accomplished in 24 hours. The technicians simply destroyed one central pump station and several batteries of very delicate control equipment which could not be manufactured in the theater.

Functional Demolitions

The functional demolition method can be considered as a combination of the two preceding methods with something extra added (see Figure 3). It requires the preparation of functional demolition plans as annexes to the theater denial plan. Each functional plan will give details relative to the destruction of all facilities of a specific industry. It should include only strategic destruction.

Responsibility for the execution of each functional plan can be given to a specific demolition task force, or it can be made the responsibility of area commanders assisted by technical demolition teams.

Here is how this method might work. In a theater of operations, petroleum production is the major industry. The theater denial plan calls for the complete destruction of all oil fields. An annex to the denial plan establishes priorities for destruction of individual fields, gives the depth of the producing horizons in each well in each field, describes the type of pumping equipment, gives the size of tubing and casing in each well, and locates the main pipe lines in each field. The annex also may include a task force organization to carry out the oil field destruction. This annex then is a functional demolition plan, and as previously noted it could be executed by either of the previously described methods.

Factors Affecting Method of Control

It may now appear that we have hedged in presenting a solution to our problem, for three possible solutions have been proposed. Actually, this is not the case—the decisions as to the method ultimately adopted within a theater must result from a careful analysis of a number of factors. The following is a partial list of such factors:

1. Theater mission.
2. Tactical plans for accomplishing this mission.
3. Extent of denial authorized by the denial policy.
4. Suitability of the terrain for use of barrier tactics.
5. Degree of specialized industrial development in the theater.
6. Attitude of civilians toward our forces.
7. The number of engineer troops in the theater.
8. The availability of demolition technicians in the theater.
9. The geographical extent of the theater.

Summary

At the present time, there is no doctrine which establishes responsibility for a denial operation or ensures integration of a denial plan and a barrier plan. Three possible methods of effecting this integration and controlling the denial operation exist:

1. Demolition task forces under theater control will perform all strategic destruction. Tactical destruction will be included in the tactical barrier plan and executed by tactical troops.

2. All strategic and tactical destruction will be planned and executed through command channels. Theater will attach technical demolition teams to subordinate commands as required.

3. Functional demolition plans will be prepared and executed by either of the preceding methods.

The Heart of a Shore Party

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"TACTICALLY, the most difficult of all operations is that of attacking, from small boats, a force defending a coast." These words, spoken by General Douglas MacArthur to a group of newspaper correspondents in May 1936, reflected the views of most students of military tactics of that day. In the light of subsequent and historical happenings from 1942 until 1950, General MacArthur's words became increasingly meaningful.

What makes an amphibious operation so difficult? What is the key to success? These are indeed profound questions, and the answers given are usually related to the personal experiences of the individuals supplying the answers. A careful analysis of every amphibious operation undertaken during World War II, and in Korea, might possibly suggest three factors as the overriding essentials for success. These are:

1. Unity of command.
2. Whole-hearted co-operation between the participating services at every echelon.
3. An appropriate size and *well-trained* shore party.

Chapters could be written on the necessity for having the first two factors—and on the difficulties encountered when they are not present. However, the purpose of this article is to discuss the third factor, the shore party, and more specifically, the amphibious support brigade and the part it plays in the shore party function.

Basically, the shore party is a heterogeneous grouping of combat and service units. Its primary purpose is that of relieving the assault combat troops of logistical worries, at a time when they must expend an all-out effort to drive the enemy from his coastal defenses in order to obtain maneuver room for subsequent operations. Once a foothold has been obtained, the shore party provides the organization required to receive, and move inland, the reinforcements and materials of war necessary to ensure victory.

The magnitude of the operation is no criterion as to whether or not a shore party is required. History has shown that the landing force must include a shore party organization.

Historical Background

Before we delve into the shore party function, let us look briefly into amphibious history and see how the need for such specialization came about.

The seafaring people of the ancient world were naturally the first to realize the potentialities of amphibious operations and to use them in warfare. Ancient history is replete with accounts of landing operations. The Athenians conducted commando raids by boat during the Peloponnesian War; earlier the Phoenicians used their primitive craft to seize enemy-held islands in the Mediterranean. Probably the first large-scale amphibious operation was undertaken by the Persians in 490 B.C., when they crossed the Aegean Sea in a fleet of 600 ships and landed 50,000 troops. A notable refinement was

The inherent flexibility of the present amphibious support brigade organization permits its employment not only in its vital shore party function, for which it was intended, but in a nonamphibious role as well

introduced by Hannibal, when he made his historic flank attack against Rome by landing not only troops, but elephants, on the undefended beaches of southern Gaul and pushing through the Alps to sweep down upon the plains of Italy.

In A.D. 930, the Greeks, realizing the need for specialized craft to facilitate the transfer of troops, animals, and equipment from ship to shore, developed the first version of a boat with beaching capabilities. Their subsequent use of these craft in raids against the Saracen pirates on Crete marked a milestone in amphibious history.

History records many amphibious landings from antiquity to World War I. Yet, it was not until the Gallipoli "adventure" in 1915 that the strategical lesson was learned that landing combat troops on a hostile shore in itself is not decisive. There can be no loss of initiative on the shore line. The infantry commander cannot maintain the initiative if he is tied to the shore line logistically.

In 1937, Japan wrote the next major chapter in amphibious history by employing all her fighting arms in concerted action using the most modern methods and equipment, tactically and logistically. In August of that year, Japanese warships and marines were sent into the Yangtze Estuary, and in November they staged a major landing. First, warships shelled the Chinese shore to neutralize defenses; second, their aircraft bombed the shore and established air superiority over the invasion beaches; and, finally, on the heels of this preparation came the assaulting marines in armored barges followed by the necessary combat supplies. Thus was the modern version of an assault on a hostile shore introduced.

Prior to 1941 the United States Army had given little real attention to amphibious matters. Fortunately, the Marines and the Navy had been planning, experimenting, and training in amphibious techniques, with the result that at the outbreak of hostilities there were three infantry divisions and two marine divisions that had received some training in amphibious operations. The method of conducting the assault, as demonstrated by the Japanese in China, was generally accepted as proper by top-ranking allied officers. However, in training and in actual operations, considerable confusion existed in the application of this method. The most perplexing part of the general confusion existed at the water's edge, where transition to land warfare began. The methods employed in transferring large numbers of men, supplies, and equipment ashore left much to be desired. Because of the failure to organize rapidly and clear the area immediately back of the high water mark, the entire operation was prone to bog down. An immediate solution to this problem assumed added significance as our military planners looked to the vast Pacific area and foresaw the numerous amphibious operations that would have to be conducted to ensure the ultimate defeat of Japan. Likewise, they visualized the tremendous amphibious force that must surely be employed to breach the walls of *Festung Europa*.

It was in this early and uncertain period of hostilities that the Army was given the mission of establishing amphibious training centers to indoctrinate ground troops in the techniques of amphibious warfare. The urgency of the program was manifested by a War Department directive in May 1942 to the Commanding General, Service of Supplies, to establish training facilities immediately, and to initiate a training program, to turn out the skilled technicians required to operate and maintain small boats and to provide the logistical organization within the beachhead to support sustained operations ashore. Because of its accumulated experience in river crossings, and in operating small boats, and because of the construction responsibilities inherent in the development of a beachhead, the

Corps of Engineers was assigned responsibility for implementing the program.

Engineer Amphibious Brigades

The family tree of the amphibious support brigade stems from the 1st Engineer Amphibious Brigade activated in 1942 at Camp Edwards, Massachusetts. With this unit, the Army was attempting to inaugurate a new concept in shore party operations, that is, the wedding of boat and shore elements into a functioning team. This was indeed a new concept in that it extended, for the first time, the responsibilities of the shore party from the water line to the sides of ships anchored off shore. The basic problem in this new concept was the development of a suitable interior organization for the brigade. It was seen at the outset that efficient operation required unity of command at every echelon of employment. This basic principle, however, was not adhered to in the initial organization of the amphibian brigades which consisted of boat regiments and shore regiments, plus a number of brigade troops. For example, the shore party of a division landing force requires one boat battalion and one shore battalion, each having three operating companies. Under the boat regiment and shore regiment concept, the division shore party was composed of a boat battalion from the engineer boat regiment and a shore battalion from the engineer shore regiment. Which regimental commander was to be responsible for the embarkation, transportation, debarkation, and movement across the beach of troops and supplies? Obviously, it was a split responsibility until the brigade commander arrived on the scene to assume over-all command.

Subsequent reorganizations resulted in the more closely knit engineer boat and shore regiment, three of which comprised the operating elements of the engineer special brigade. This organization, adopted primarily to achieve the unity of command so badly lacking in the earlier grouping, provided control in depth and proved to be extremely effective. The actual organization will be discussed later.

Brigades in the European Theater

The 1st Engineer Amphibious Brigade, later redesignated as the 1st Engineer Special Brigade, performed outstandingly during the North African campaign, and then met the fate of many highly specialized units unable to perform their specialty with regularity. Further, it became evident early in 1943 that the operation of landing craft in the North African theater by Army units was frowned upon by the Navy, and in a very short time the 1st Engineer Special Brigade became a shore unit with only fond memories of its amphibiotic past.

Two other engineer special brigades were activated in England with the sole mission of shore operations. These brigades, the 5th and 6th, were organized around engineer combat battalions reinforced with service troops and, under a provisional engineer special brigade group, formed the nucleus for the Omaha Beach shore party.

Brigades in the Pacific Theater

A total of four engineer special brigades, including the 1st, were activated in the United States. All four eventually were sent to the Southwest Pacific area. Of these four, the 2d, 3d, and 4th actually functioned as originally intended, as a boat and shore team. The 1st, still minus boats, arrived in the Pacific after VE-day and performed shore party operations in the Okinawa invasion. Rather than enter into a detailed account, in this article, of the operations of the engineer special brigades in the Pacific area, the reader is best referred to Brigadier General William F. Heavey's *Down Ramp!* and to *Amphibian Engineer Operations,* Volume IV in the series *Engineers of the Southwest Pacific, 1941-1945,* soon to be published.

Mission of the Shore Party

To understand the need for a specialized unit around which the shore party organization can be built, it is desirable first to understand just what the shore party does to support the amphibious operation.

While certain responsibilities in connection with the out-loading of the landing force are usually assigned elements of the shore party, its primary contribution commences on the hostile far shore. For the purpose of discussion, assume that the landing force for a designated operation is composed of one infantry division, reinforced. The reinforcements involved are, in the main, the shore party elements.

The tactical plan for the invasion calls for landing two regimental combat teams abreast, one regiment on Blue Beach, another on White Beach. Blue Beach and White Beach are 1,500 yards apart. The shore party commander realizes that he must develop both beaches until such time as the tactical situation permits the consolidation of most of the activity on one beach. In preparing the shore party plan, he visualizes, as a minimum, the following initial missions on each beach:

Conduct early reconnaissance (reconnaissance personnel to land with the assault rifle companies in the first or second wave).

Mark beach limits.

Mark exit sites.

Construct exit roads.

Construct lateral roads, to include connecting roads between the beaches.

Prepare dump sites.

Place the traffic control plan into effect and furnish the necessary personnel to enforce the plan.

Move supplies from the water's edge to the initial dumps.

Direct the landing craft to beaching spot.

Establish wire and radio communications with the infantry, and between the beaches.

Establish and operate beach medical facilities.

Maintain radio and visual contact with the Navy control vessel and the command ship.

Establish prisoner of war enclosures.

Establish water points.

Remove natural and artificial obstacles.

Construct temporary bridging where required.

Establish a perimeter defense and local security measures within each beach support area.

Clear mined areas and dispose of the dud bombs and unexploded shells.

Prepare beaching slots for the landing ships and furnish the necessary personnel, equipment, and transportation to unload these ships.

Provide hatch crews for unloading cargo vessels.

Lay beach matting as necessary.

Establish an information center to assist in the orderly movement of personnel and supplies across the beaches.

Provide equipment to assist drowned-out vehicles across the beaches.

Establish dewaterproofing areas.

Establish salvage collecting points.

Provide lighterage and lighterage control after the departure of the assault shipping.

Perform such additional construction as may be required.

A Continuing Mission

A consideration of the foregoing missions that must be performed on each regimental combat team beach logically raises the question, Who performs them? Before that question can be answered, plans must be projected into the next phase of the operation, that is, the consolidation of the regimental combat team beaches into a division beach support area. The

shore party commander realizes that all the missions listed above must be continued after the consolidation has been accomplished; that additional problems will arise as the build-up of supplies and reinforcements gains impetus; that temporary beach dumps will be abandoned and permanent beach dumps established; that special units will be required to operate the permanent dumps; that accurate and detailed documentation of supplies must be accomplished; that possible requirements for landing craft for coastal flanking attacks must be met; that lighterage to unload follow-up supply convoys must be furnished; that maintenance facilities for the landing craft must be established; that his troops may be called upon in emergency to repel enemy attacks against the beachhead; and that medical facilities must be maintained to treat and evacuate casualties.

Tailoring the Shore Party

Considering the fact that a great many of the shore party tasks must be initiated immediately after H-hour, and also that the majority of them are in progress simultaneously, the landing force commander may well wonder how the troops and equipment required to perform the tasks can be loaded into available shipping and still leave sufficient space for his combat units. Yet, the tasks must be done, and troops must be provided to do them. Therefore, let us start the building of a shore party organization. As the base for our shore party we have an amphibious support brigade, the third generation engineer amphibious brigade. The basic organization of the amphibious support brigade is the same as the former engineer special brigade. As organized, it is designed to provide the nucleus of a corps shore party. As may be seen in the chart on page 39, the operating elements of the brigade consist of three amphibious support regiments. Each of these regiments is designed to provide the shore party nucleus for a reinforced division shore party.

As presently constituted by tables of organization and equipment, the brigade headquarters is a branch immaterial organization. As such, it may be commanded by a qualified brigadier general without regard to branch affiliation. Brigade troops are comprised of those units essential for the operation of the brigade headquarters, and for the direct support of the operating regiments in certain technical aspects. With approximately 850 items of rolling stock, 8,000 weapons, and 500 water-borne vessels (DUKWs included) within the brigade, the necessity for organic maintenance units is readily apparent.

For our division landing force, we are given one amphibious support regiment as the base, or nucleus, around which to build the shore party organization. Around this nucleus we place the specialized units, and the detachments of units, required to accomplish the many and varied tasks ahead. When our troop list for the division shore party is completed, it may contain substantially the following units:

1 amphibious support regiment
1 engineer combat battalion
1 headquarters and headquarters detachment, transportation truck battalion
3 transportation truck companies
1 transportation amphibious truck company
1 headquarters, headquarters and service company, transportation port battalion
3 transportation port companies, type A
1 detachment, quartermaster headquarters and headquarters company
3 quartermaster service companies
1 platoon, quartermaster subsistence supply company
1 platoon, quartermaster petroleum company
1 company, military police battalion
1 prisoner of war guard detachment
1 medical clearing company
1 platoon, ambulance company
1 chemical smoke generator company
1 medical supply detachment
1 ordnance ammunition supply detachment
1 explosive ordnance disposal squad
1 engineer supply team
1 detachment, ordnance depot company

1 signal supply detachment
1 quartermaster salvage collecting team
1 chemical supply team
1 naval beach group
1 detachment, signal company *
1 platoon, ordnance maintenance company *
1 company, transportation boat maintenance battalion *

In addition to the units listed, the shore party also may obtain two additional amphibious truck companies which are used initially to transport the light artillery battalions ashore. As an aid to establishing the beach support area perimeter defense, the division commander also may attach a battalion of armored landing vehicles (LVT(A)s) to the shore party, after the division tanks have been landed. These vehicles would be used during the early stages of the landing to provide additional fire power for the assault troops.

Combat-Shore Party Ratio

Including the transportation boat battalion of the amphibious support regiment, the total number of troops involved in the division shore party organization will approximate 8,000. This is roughly one shore party soldier for each three combat soldiers. The uninitiated may well look at this ratio with horrified eyes until an explanation is made that this is only a temporary ratio. The same shore party will remain on the beach to move other units across. Furthermore, as the assaulting division advances inland it must take its organic service units with it. Hence, a complete and separate logistical organization must be provided to stay behind and operate the all-important beach support area. When the assault phase has ended, the majority of the 8,000 troops will be absorbed into the army or communications zone base section for permanent employment in the base development program. Other elements of the original shore party will be available for subsequent amphibious operations, when relieved by the base units.

Amphibious Support Regiment

Now let us consider the operating regiments of the amphibious support brigade, and how they perform their mission. Organized under TO&E 20-511, a forthcoming change to TO&E 5-511, dated 26 January 1951, the amphibious support regiment's official mission is: "To support, until relieved by base units, Army forces in joint amphibious operations by establishing, defending, and operating beach support areas; and to provide tactical mobility and combat and logistical support for shore-to-shore operations."

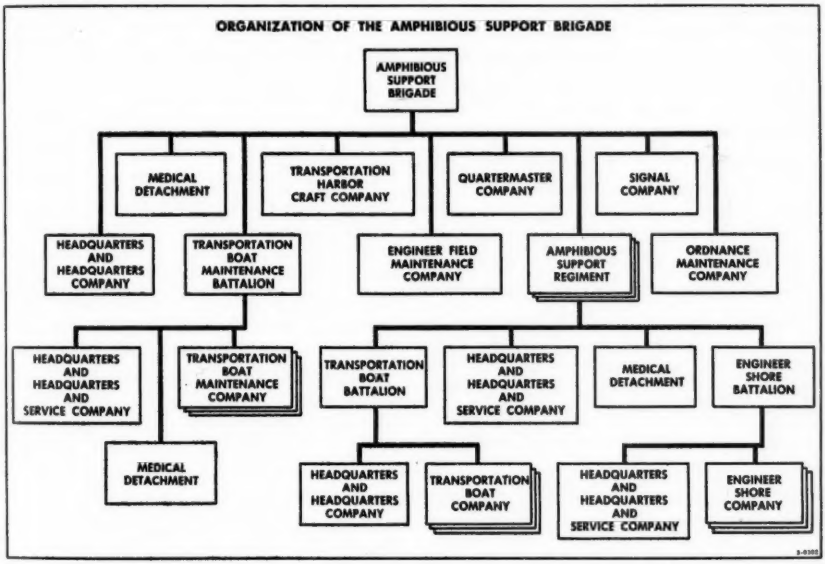
Structurally, the regiment has not been changed from the engineer boat and shore regiment of World War II. Within the framework of its organization there is a headquarters, headquarters and service company, a transportation boat battalion, an engineer shore battalion, and a medical detachment. The headquarters company contains administration and supply, intelligence and operations, maintenance, communications, and embarkation sections.

The engineer shore battalion, consisting of a headquarters company and three operating shore companies, performs the functions implied by its name. Each shore company is designed to provide the nucleus for a regimental combat team shore party. Within the company, two identical shore platoons are organized and equipped to support the assault battalion landing teams of the regimental combat team. Each shore platoon is further broken down into three shore sections to furnish direct support to assault companies of the battalion landing teams.

The transportation boat battalion of the amphibious support regiment is structurally the same as the shore battalion. In operations and training, companies of

* The units designated by asterisks are attached to the amphibious support regiment from the amphibious support brigade. Other elements of the brigade (transportation harbor craft company and engineer field maintenance company) may support the amphibious support regiment, but will not necessarily be attached.

the boat and shore battalions are usually paired off to create the "team" relationship so desirable for units of this nature. The boat battalion has a total of 146 boats of which 129 are landing craft, mechanized (LCMs), the work horses of the battalion. The remaining vessels are



command, navigation, and patrol craft.

Responsibility

Planning by the amphibious support brigade commander and his staff commences as soon as the operation plan is announced. The brigade staff advises the army, or corps, staff on the employment of the brigade to achieve maximum efficiency. Each regiment establishes liaison with the division it has been designated to support. Normally, the amphibious support regiment will be attached to the infantry division until such time as the corps assumes control of the beachhead. At that time, it may revert to the parent amphibious support brigade.

The wise division commander will relieve himself and his staff of innumerable headaches by delegating supervisory and co-ordinating responsibility for the outloading of the division to the commander of the attached amphibious support regiment. He and his staff have been trained and are experienced in the intricacies of fitting military equipment and supplies into the various types of naval shipping. In the theater of operations, convenient and adequate port facilities are not always available and the necessity for out-loading across beaches, actually an amphibious operation in reverse, permits the use of the peculiar talents and equipment of the amphibious support regiment to good advantage.

Marshalling Phase

During the marshalling phase of the operation, units designated to be a part of the division shore party organization are usually attached to the amphibious support regiment. The regimental commander, with an eye to operational requirements, organizes a shore party for

each beach to be used in the assault, and makes plans for regaining centralized control as soon after H-hour as possible.

The transportation boat maintenance company, attached from the parent amphibious support brigade, should be further attached to the boat battalion of the amphibious support regiment. The boat battalion commander is held responsible for the operational readiness of his craft and without exercising command over the maintenance unit he cannot be expected to keep the maximum number of craft in operation.

Embarkation Phase

During the embarkation phase, detailed plans for loading the shore party are just as essential as for the assault rifle companies. Success on the far shore depends not only on the fighting infantrymen but also on the timely arrival of shore party personnel and equipment to provide the infantrymen with the wherewithal to keep fighting. In scaling down divisional troops, vehicles, and equipment to meet shipping limitations, the landing force commander must recognize the necessity for scheduling at least 80 percent of the shore party personnel and vehicles in the assault convoy. Boats of the amphibious support regiment, while not requiring the initial priority of bulldozers, must be phased into the operation as rapidly as possible.

Operations Ashore

Amphibious operations are characterized by *centralized* control during planning and *decentralized* control during initial execution. This character of amphibious operations is exemplified not only in the infantry phase but in the shore party function as well. During the critical period when initial assault waves are being landed, reconnaissance personnel and equipment operators of the shore party are almost entirely self-dependent. Landing plans should provide for the arrival of shore party tractor-dozers on each battalion beach prior to the arrival of any other vehicle. The necessity for the early arrival of these earth movers to clear beach exits, bridge tank traps, and assist wheeled vehicles across the beach has been demonstrated on every landing recorded since 1942.

Centralization of control is accomplished in the beachhead as rapidly as the situation permits. Company commanders of the engineer shore battalion arrive early and assume control of the shore party functions on the regimental beaches. The reconnaissance personnel will have located and marked initial beach dumps, and incoming supplies are diverted to these dumps as soon as possible. Further centralization of control takes place as the shore battalion commander lands and is able to direct the activities of the company commanders. Personal reconnaissance by the shore battalion commander verifies, or disapproves, the adequacy of the development plans for the division beachhead. It is at this critical period when the shore party commander's initiative becomes all important; when the value of trained personnel and a specialized organization pays off. Decisions must be made and implemented without delay. Each man must know exactly how to accomplish his individual task. Critical changes necessary to the original shore party plan must be placed into effect without confusion and without hesitation.

When the shore party commander is satisfied that his organization is sufficiently prepared, the general unloading of supplies and equipment may commence and the logistical build-up is underway.

Beach Support Area

The area immediately inland from the landing beaches is often referred to as the beach, the beachhead, the beach maintenance area, or the beach support area. The latter designation is generally accepted for common usage at the present time. Regardless of what it may be called, it is an area within which the shore party

commander must be king. It is his responsibility to organize and direct the defense, the traffic plan, the input and output of materials, and the allocation of space. Without strict, *centralized* control of these activities, the result is bedlam. As the build-up increases, the size of the beach support area increases. Eventually, what was once the division beach support area may develop into a base section containing many square miles of open and covered storage, and terminal facilities for the logistical support of hundreds of thousands of troops.

Lighterage

Probably the most controversial facet of the amphibious support brigade concept for shore party operations is the inclusion of an organic boat element. Proponents of the presently authorized amphibious support brigade organization maintain that the organic boat elements provide the commander with a necessary tool to perform his shore party mission; that unity of command requires that the boats be operated and maintained by Army personnel. More liberal thinkers argue that it matters little who mans the boats; that the Navy could provide the boat element to the shore party and the end result would be the same. The most logical argument against the boat battalions of the amphibious support brigades, as presented by some naval experts, is the problem of transporting the craft to the objective area. It cannot be denied that the over water lift of even one boat battalion requires considerable shipping space, and with the trend toward larger capacity landing craft, the problem becomes even more complex. However, it is not insolvable and the naval argument is not entirely valid. Boats for lighterage and combat missions must be available to the landing force commander, and regardless of which service supplies them, they must be transported to the far shore, and left for landing force employment. Therefore, as the lift must be accomplished, why lose the manifest advantages of the integrated amphibious support brigade organization by substituting boat units from another service?

Assault Craft

Assault transports (APAs), carrying assault infantrymen and a modicum of cargo, can usually be discharged with organic landing craft (LCVPs). Assault cargo ships (AKAs), carrying a higher ratio of cargo than APAs, also can be unloaded with their organic lighterage. The problem arises when these assault vessels have departed and the re-supply convoys arrive carrying tons of badly needed cargo but without sufficient organic craft to accomplish the unloading. Getting these critical supplies from ship to shore requires cargo-carrying landing craft available to, and under control of, the forces ashore. Furthermore, a tactical requirement for landing craft sometimes arises within the first days of the assault as the landing force commander seeks to envelop the enemy defenses by coastal flanking attacks, or by navigable river operations. With these thoughts in mind, an arrangement can usually be made whereby the commander of the naval transport group, furnishing water lift for the assault elements of the division, will leave some of the landing craft organic to his ships in the embarkation area to be recovered at a later date, and in their place transport craft of the amphibious support brigade. Other shore party craft (LCMs) may be towed to the objective area by the landing ships (LSTs and LSMs) of the fleet. Still others may be carried by landing ships, dock (LSDs), designed for that purpose.

Upon arrival at the far shore, *all* landing craft are under the naval command during the unloading of the assault shipping. The amphibious support brigade craft revert to the control of the shore party only when they are released by the

Navy. This release should take place when all of the APAs and most of the AKAs have been unloaded and, in any event, when the Navy control vessels have departed the area.

The present naval organization provides for naval beach groups, commissioned units designed to supplement the shore party organization of Marine Corps divisions and to a limited degree, Army shore parties. Within these naval beach groups may be found boat units, beachmaster units, salvage units, and ponton installation and maintenance units. As a normal practice, certain of these components are integrated into the Army shore party for designated operations. When naval boat units are employed, they should not be considered as a substitute for boats of the amphibious support brigade.

Lighterage and Cargo Control

As has been stated, landing craft of the amphibious support brigade become operational early on D-day. The brigade boat control organization is not placed into effect as long as the Navy control system is present and functioning. However, as soon as the situation dictates, the boat battalion commander of the amphibious support regiment establishes himself ashore and directs the activity of his craft.

To ensure continuity and smoothness of the cargo discharge operation, each amphibious support regiment appoints a "cargo control officer." One of his duties is to co-ordinate the allocation of shore party lighterage to cargo ships being unloaded. This co-ordination is necessary in order to prevent the "stacking up" of lighterage at ships side, and to ensure that hatch crews (shore party port companies) are not idle because of a lack of lighterage. Working with a designated crew member of each ship, as well as with Army personnel assigned to each ship as "loading officers," the cargo control officer also maintains a current check on the unloading progress and a record of the supplies discharged each day.

Lighterage control and cargo control mechanisms placed into effect by the amphibious support brigade are not intended to supplant naval controls in an amphibious operation. Rather, they are designed to take over when naval control ceases.

Summary

As previously shown, the amphibious support brigade is no longer an engineer unit in its entirety. A conversion of the boat elements from engineer to transportation table of organization and equipment designations has resulted in composite regiments under a branch immaterial brigade headquarters. At first glance, this unorthodox organization may seem to be impractical, yet the logic of it cannot be denied. Who can better perform a function than units designed to perform it? Remembering that the amphibious support brigade's primary mission is a specialized one, and that each echelon of control within its organization contains both engineer and transportation planners and staff officers, operational proficiency should be materially improved. Once the new organization has been battle tested, minor organizational modifications may be required in its structure. However, the present organization is basically sound and future modifications are more apt to be required by virtue of new types of equipment rather than by structural discrepancies.

The creation of special units to perform special tasks is not always desirable in an army as "division slice" conscious as ours. However, the inherent flexibility of the amphibious support brigade organization permits its employment in nonamphibious roles when required, yet it remains available to fulfill the vital shore party function for which it was designed.

A New Blade for an Old Weapon

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RUMOR, speculation, suspicion, vague fears of the unknown, ignorance, doubt, and anxieties can destroy the fighting effectiveness of an army quicker and more completely than can the combined arms of an efficient, well-trained, and well-equipped enemy. The weapon we use against this invisible foe of fighting effectiveness is an old one. It has been used by great military leaders through the centuries to dispel doubts, fears, and rumors, and to inspire their troops with patriotism and ineradicable conviction that the cause for which they fight is a just and righteous one.

The Weapon

Ordinarily, we think of a weapon as an instrument of offensive or defensive combat; that is, a gun, a knife, or a club with which we can inflict bodily harm on an opponent. Actually, the term weapon is far more inclusive and may be mental or spiritual. It may be an instrument which appeals to the hearts and minds of men. The Army Troop Information and Education program is such an instrument.

In the early days of World War II, the Army brought out this fine old weapon from the storeroom where it had rested unused since World War I. It was reconditioned and put into service at reception centers, training centers, oversea theaters, and at posts, camps, and stations, where it did yeoman service throughout the war. After hostilities ended, this weapon was retained in service. It has been improved and modified since that time, until today its cutting edge is razor sharp and it is now considered indispensable for maintaining an effective army with high morale and *esprit*.

Its Use

Today, commanders at all echelons are using this modernized weapon to increase the effectiveness of the Army by the employment of *information* to increase understanding and *education* to increase the ability to understand.

Like any other weapon, Troop Information and Education gets its ultimate test in wartime. The success of the Troop Information and Education programs which have been conducted prior to war will be measured by the extent to which they have contributed to military effectiveness, which includes *esprit de corps* and the will to fight. In wartime, the emphasis and scope of the Troop Information and Education program shifts to meet the requirements of mobilization, combat, and demobilization. At that time, the information portion of the program becomes paramount. The education program consists primarily of basic education to ensure that

Troop information and education is one of the most efficient weapons that a commander has to increase the combat effectiveness of his command. If he fails to use it, he weakens the fighting potential of his unit

each soldier can read, write, speak, and understand the English language.

During mobilization, troop information is of particular importance. To be effective, the new soldier must understand *why* he is in the Army, *what* he as an individual is expected to do, and *why* he should do it. The vast number of individuals which the Army must rapidly absorb come from all parts of the country, are of varying racial origin, and have varying religious and political beliefs. These individuals know nothing of military life, and even if they were of the same general educational and cultural levels, they would still create a big problem. When these men come from all strata of our society, with an educational level ranging from illiterate to Ph.D., the problem is greatly magnified. Specifically, it is necessary to ensure that they understand:

Why they are in the army.

What our Nation is fighting for.

How they as individuals fit into the national picture.

Why our cause is worth fighting for.

What their individual obligations as citizens are.

What their responsibilities as soldiers are.

Where they will go.

What they will do.

Mobilization Information

During the mobilization training for these individuals, as they are welded together as an effective fighting team, troop information is continued as a part of that training in the following primary fields of information, all of which are essential to the development of an efficient soldier:

1. *Why we fight.*—The reasons and the alternatives.

2. *The enemy.*—How he thinks and fights, his philosophy and its application to his everyday life, his propaganda methods, and how he conducts himself in battle.

3. *Our allies.*—Descriptions of allied peoples and countries, their ways of life, and their contributions to the common effort.

4. *Pride in outfit.*—The functions and missions of his unit, its part in the team and his job and its importance. These things help to develop self-respect and pride in himself, in his unit, and in the Army as a whole.

5. *The United States and its future.*—Democratic traditions and ideals that have shaped the Nation, our strength and ability to employ these principles in peace and to adapt them to war.

6. *The news and its significance.*—Salient facts of military and world news and their effect on the soldier and his future. This includes the ability to discriminate between facts and rumors and recognize propaganda.

Operational Orientation

Upon the completion of training, the individuals now welded together as an effective military unit are sent to a theater of operations. Troop information is not boxed or crated with other weapons of the command for shipment with the unit to its oversea destination. Rather, it is completely checked to ensure that it is in tiptop condition to accompany the unit for use en route at the ports of embarkation and debarkation. During this period, troop information is used to further increase the fighting potential of the soldier by making certain that he is aware of his mission, his importance to his country, and the gravity of his combat task. He is further motivated in the task before him by the reiteration of factual reasons for American involvement in the conflict. Our enemies and our allies in the conflict are clearly identified. Finally, the soldier is thoroughly oriented regarding the importance of the conflict in the area to which he is being sent by summaries of events leading up to and including the present campaign.

Upon arrival in the oversea theater,

troop information continues its offensive against ignorance and misunderstanding by orienting the soldier regarding situations and local conditions that he is likely to encounter and by fostering his understanding of the mission of the command, supplementing rather than repeating informational materials utilized en route.

Information in the Wartime Theater

In a wartime theater of operations, the emphasis on information becomes more pronounced with less emphasis being placed on the educational aspects of the program. This shift in emphasis continues as the front lines are approached. In the combat areas, the troop information program is devoted primarily to supplementing useful battle information and consists almost entirely of general information on the course of the war, happenings at home, and in other theaters, and the necessity for the individual soldier to be where he is.

Troops newly arrived in a theater must be informed of many things if their fighting effectiveness is to be maintained. Mental training must be continued even though mental conditioning has been well advanced prior to arrival overseas. Information regarding customs, social conditions, habits, prejudices, religious convictions, and likes and dislikes of the peoples of the country is essential. Troops must be informed about the geography, the climate, and other specific conditions affecting health and welfare. It is of great importance that the troops understand their responsibilities as representatives of the United States in the eyes of allied, cobelligerent, neutral, and enemy civilian populations.

The Combat Program

It is in combat that the importance of troop information reaches its greatest heights. All too often this superb weapon is allowed to lie unused on the battlefield. All to often troop information ceases at the very time when it is needed most. True, our best commanders have always found ways and devised means of informing their men regarding operational matters and to some extent on what was going on outside their immediate combat zone. Unfortunately, little has been written on the subject of applying troop information in combat, and, therefore, it has not been stressed in training as a specific problem to be solved. It is tragic to lose a battle for want of a weapon, but it borders on stupidity to lose a battle because the weapon at hand was not used.

Information Should Be Meaningful

The soldier under fire makes little distinction between various types of information (troop information, intelligence, operation orders, and news). Leadership at its best replaces the formal troop information program used in training and back of the front lines. The commander himself, as in the formal program, must, in addition to the many other things demanding his time and effort, direct and systematize methods of keeping his men informed. What information should the man in combat receive? Each piece of information should be meaningful and should serve one or all of the following purposes:

1. To create and sustain the will to fight.
2. To foster and sustain morale.
3. To build up and maintain combat effectiveness.

The Will to Fight

The mental, moral, and spiritual determination of a fit, trained, and equipped soldier delivers victory in combat. Military efficiency does not consist solely of efficient organization, technique, and direction. To the fighting man, every plan of battle resolves itself into two choices—duty and safety. It is the commander who prepares, or who causes, his soldiers under fire to choose duty over safety.

The American soldier does not fight as much from instinct as through reason.

Good commanders understand the human values which motivate their men, namely: discipline or fear of punishment, the inward feeling of duty, idealism (patriotism and tradition), the desire to win approbation, the psychological attitude for protection of self or home, and to a lesser extent the desire for retaliation, revenge, release from moral responsibilities, or because they like to fight.

Troop information can make a major contribution to the first five of those listed above and may be able to elevate the motives of the last without loss of intensity into other, more acceptable categories.

Ideals are seldom worth fighting for unless they are one's own. For the American soldier faced with sudden and violent death, ideals based on facts must be reduced to their simplest common denominators. The thing the soldier most needs to know is that it is his war, a war in which his own future existence and that of his loved ones is at stake. Once he grasps this idea, he is better able to appreciate the value of his personal combat effort.

In the final analysis, most men fight to win self-approbation or the approval of their comrades and to be worthy of their unit. The good leader encourages these individual efforts by prompt recognition of accomplishments. Citations and decorations are published to the entire command. Personalized news releases are made to the newspapers, both in the theater and at home. Every new soldier is fully informed of the past accomplishments of his unit. Histories and after action reports are prepared in full detail. Lower echelon intelligence summaries include the outstanding daily accomplishments of individuals. All of these means, and many more, are available to the commander to provide the combat soldier with the recognition which he deserves.

Morale

The soldier's attitude toward frontline combat duty is greatly affected by what he knows. His willingness to do any given task at any time is a reflection of the confidence he has in himself, his leaders, his equipment, and his friends. Lacking knowledge or experience of these four factors, he is beset by anxieties, doubts, and vague fears. These, aggravated by danger, hardship, and privation, cause him to dwell more on his miseries and less on his duty. Rumor, speculation, and suspicion temper the facts on which he should judge his situation objectively. Finally, he loses confidence, and has neither the heart nor the mind to act. He continues to reason for himself, with or without facts. A constant flow of factual information replaces rumor and speculation, doubt, and anxiety.

Among others, there are five important factors that damage morale in the combat zone, namely: surprise, boredom, rumors, poor leadership, and unwarranted hardships. The adverse effect of all of these can be minimized through the proper use of troop information.

Surprise damages morale because perception is faster than adaptability. Surprise results in confusion and helplessness. Men lose confidence in themselves and in their leaders. Given full information, it is difficult to surprise a good soldier. Eliminate overclassification and too little dissemination. The battle information channel is a two-way circuit.

Boredom dulls keenness. Enforced inactivity causes thoughts to turn inward to personal difficulties. Through constant attention, difficulties are magnified out of all proportion. Dissention and dissatisfaction are inevitable results. Information concerning the progress of the war on the other fronts is important. News regarding preparations for the resumption of the offensive is welcome. The use of all types of troop information is practical and all types should be employed.

Rumors circulate rapidly in military

organizations. They create uncertainty and hallucination where in reality none exists. Rumors are more dangerous when they have some slight basis in fact. Fear-type rumors are countered through intelligence and discussion; hope-type rumors through facts which are later confirmed. Complete and continuous dissemination of full information is the only real method of stopping rumors.

Poor leadership may be corrected by education; that failing, the individual must be relieved.

Unwarranted hardships and privations are often mental. Necessary hardships are endured in war by fighting men as long as they are borne equally by all members of the command. They are unbearable when considered unnecessary or borne alone. A combat soldier has a right to know the "why" of hardships he must endure. Hardships that are not routine should always be accompanied by full factual information (not excuses) of their necessity. The commander's word is usually sufficient, but the word must reach the man who bears the burden.

Combat Effectiveness

To create the will to fight is not enough. Blindly applied or misguided, combat power does not develop its full potential. Every combat commander recognizes the need for intelligent direction, based on full and complete knowledge down through the ranks. This same rule applies to the individual soldier. The speed, dispersion, and shock of modern war demand a soldier who can act intelligently and co-operatively under, or in the absence of, specific direction. This type of soldier is fully informed not only of the enemy and of combat lessons, but also of what everyone else in his unit is doing and is supposed to do, and of the mission of the command as a whole.

Most battle information is compiled in a form that is unintelligible and uninteresting to the front-line fighting man. Much can be done in lower echelons to disseminate this information in readable and declassified form.

Prepared Material Is Effective

Respites from combat often find commanders at a loss for material suitable for troop discussion. Formal literature is readily available and guides for discussion already prepared. These materials, especially on the "big picture," save time and effort in orienting combat troops.

There are two general methods which may be used to disseminate information in the combat zone: through the commander and his staff and through the distribution of specifically designed materials. A combination of these methods is most frequently used.

A major portion of the information received comes down verbally through the chain of command. The only limits to dissemination by the commander and his staff are the time available, ingenuity applied, and security. Radio has greatly increased the possibilities of this method of dissemination.

A valuable potential for dissemination which many commanders have failed to exploit is the materials available through the troop information program and the proper use of troop information personnel.

TI&E Personnel

An infantry division is provided two officers and nine enlisted personnel for full-time troop information and education duties. They should be used to make a continuous determination of troop informational needs, to keep the commander informed of these needs, to prepare periodic news bulletins, and to disseminate troop information by the most practical means. They should also ensure that troop information materials and supplies, including radio receivers, are provided. Such personnel should not be relegated to rear echelons where their only duty is to orient

replacements or to run rest camps, as frequently occurred in World War II and to a lesser extent in Korea.

An Example From Korea

One regimental commander kept his troops informed during combat in Korea by starting a daily paper. This paper was published daily except Sunday. The first page was devoted to world news of importance, including the latest developments in Korea. The second page was devoted to the activities of different units within the regiment and the achievement of individual soldiers. The press run of 600 copies was sent up with the chow when the regiment was in the front line. The men read it and passed copies from foxhole to foxhole. The paper was cranked out on a mimeograph machine under all types of battle conditions, and its editors never missed an edition even though at times the enemy was almost on their heels.

This is an example of leadership and the proper application of troop information in combat. Those who are familiar with this paper are agreed that it paid handsome dividends in creating and sustaining the will to fight, in high morale, and in making combat power effective.

Commanders who have complained of low morale and apathy on the part of their troops might well take a lesson from this example.

General Ridgway's message as Commanding General, Eighth Army, to his troops in Korea on why we fight in Korea is another example of the proper application of troop information in combat.

The conflicting statements regarding Korea from high government officials, the lukewarm and often hostile attitude of the American people toward the Korean conflict, newspaper accounts of the war that is not a war, and the delays, stalling, and prolonged haggling at the truce conference would normally create a terrific morale problem among troops involved in this conflict. However, from all reports, morale among our troops in Korea is good, and an effective troop information program can take much of the credit for it.

Troop information has proved itself to be a superior weapon against rumor, doubt, low morale, suspicion, and uncertainty in combat. The commander who fails to use it weakens the fighting potential of his unit.

A Demobilization Program Required

When the fighting ceases and the guns and other weapons begin a much earned rest, troop information still has a big job to do. A long-range program should be started prior to the end of the fighting to prepare the troops on the fighting front for the end of the war. The aim or purpose of this program should be to provide the troops with information and understanding of the task to be accomplished after the fighting is over. It should emphasize the physical impossibility of an early return home for many of the troops overseas, even if there were no occupational duties to be performed.

A Lesson From History

We should have learned a valuable lesson from the wild stampede to get home and the resulting demobilization debacle which occurred in 1945 after VE-day and VJ-day. We had built up the greatest Army the world had ever seen. Its might was respected from one end of the globe to the other. Then the world saw this Army crumple almost overnight. As a result, we lost a great deal of prestige which postwar events were to show we could ill afford to lose. An orderly demobilization of this magnificent fighting force would have done much to deter those who since the war have attempted to push us around.

The near mutinies which occurred among our soldiers at many points over the globe during this demobilization tragedy were in very few instances inspired by disloyalty or a lack of patriotism. While it is true that a communistic element did much to

fan the flames, by and large, the real culprit was ignorance; ignorance of the *facts* concerning the situation.

Our troops did not realize the number of ships needed to take them home, or the facilities, transportation, supplies, and administrative procedures necessary to separate them from the service. Nor did they stop and think of the impact on civilian economy of a mass demobilization. More important, there was practically no concept among our soldiers of the many occupational tasks which had to be accomplished if we were to win the peace.

Unfortunately, a great many were led to believe that their demobilization hardships resulted from arbitrary and capricious decisions by their commanders. Unfortunately, we did not have the weapon of troop information ready and in working condition to combat this inflamable mental condition.

In the gathering momentum of the stampede, pride, tradition, and logic were swept away. Some examples of incompetent leadership were blown up to grotesque size and finally cast their shadow upon the entire officer corps, which was held up to ridicule and slander, despite the fact that this very same corps of officers had led the United States forces to the greatest victory the world had ever known.

The disastrous effects of this period will be long felt by the Army and its corps of officers.

It is reasonable to believe that had there been on tap a well-organized information program, with well-trained personnel to administer it, commanders at all levels would have been able to prevent the trouble by explaining to their troops the necessity of completing the job and winning the peace by surrendering some of their civil liberties temporarily as an expediency in an emergency—just as their forefathers have done throughout our history.

During a period of demobilization where large numbers of troops, of necessity, must remain in a theater even though the fighting has ceased, troop information is indispensable as a means of ensuring that troops understand the reason *why*. An education program, using all possible local facilities and presenting full educational opportunities, will do much to take the edge from idleness.

Summary

The weapon of troop information and education is ready and available along with the other weapons of our armed forces. Its blade shines and its edge is keen. It needs only the strong arm of the commander to accomplish its mission of increasing the fighting effectiveness of the Army by destroying doubts, fear, anxiety, ignorance, rumors, and low morale.

We can do with nothing less than the best leadership—the kind of leadership which can take men to fight through difficult dangerous country, under conditions unparalleled in the experience of most of us, facing the continual threat of wounds and death. This kind of leadership has no counterpart in any other leadership field.

Secretary of the Army Frank Pace, Jr.

Summer Arctic Operations

Major Edwin C. Gibson, *Infantry*
Office, Chief of Information, Department of the Army

The views expressed in this article are the author's and are not necessarily those of the Department of the Army or the Command and General Staff College.—The Editor.

WHEN early explorers first ventured into the Far North, they went prepared to work in the summer and hibernate in the winter. They soon discovered, however—as did the trappers, the prospectors, and the soldiers who subsequently followed them—that the Eskimos did most of their travel in the winter. Good travel conditions are a basic requirement among hunting peoples, who must follow the game. The best time for travel is in the winter, after lakes, streams, and muskeg are frozen over and blanketed with snow and dog sleds can be used.

Today, our Army is fully exploiting the fact that mobility in the Arctic is relatively easy to achieve in the winter. Dog teams have been replaced by tractor sled trains and track-laying personnel and cargo carrying vehicles, all of which operate with little preparation other than the avoidance or removal of normal obstacles. Although emphasis on the development of special equipment continues, especially as regards clothing and transportation, our military forces are now capable of moving and fighting in the Arctic in the winter.

Summer Mobility

But what about mobility in the summer, when the routes which may be used in winter disintegrate and the many lakes, streams, and swamps impede movement?

As one means of investigating this problem, in the spring of 1950, the Department of the Army directed the Army Arctic Indoctrination School at Big Delta, Alaska, to organize and conduct a summer field exercise. The purpose of the exercise was to familiarize officers and noncommissioned officers with the conditions that they would encounter should they be forced to operate in the Arctic in the summertime. The directive stated that this training was to complement the winter course of instruction and that, to the greatest extent practicable, priority in the selection of students would be given to personnel who had received the winter indoctrination.

As a result of the success of the two field exercises conducted that first summer and three more conducted the following year, training in summer arctic operations has become a permanent part of the Army Arctic Indoctrination School's mission. This summer, three field exercises were held by the school, with approximately 150 officers from the Zone of Interior and 50 officers and 50 noncommissioned officers from the Alaska theater receiving instruction.

Recognizing that the success of summer arctic operations is dependent primarily on attaining cross-country mobility, the school set about exploring, through the medium of the field exercises, the possibilities of moving troops and supplies over every type of terrain common to the polar regions. In these practical tests, the unit of measurement employed was the basic infantry unit—the rifle squad—followed, in turn, by the rifle platoon and the rifle company.

Big Delta Region

Utilizing the Big Delta region, where, within a radius of 50 miles, a veritable arctic terrain laboratory exists, movement over the following three dominant types

of relief was studied: mountains, highlands, and lowlands (see the sketch map on page 53).

Although these features are found in varying extremes and combinations in the Arctic and sub-Arctic, the pattern they present at Big Delta, which is located in the sub-Arctic, is typical and one that is repeatedly encountered throughout the entire arctic operations area. For convenience, the separate areas of the Arctic and the sub-Arctic will be referred to collectively throughout this discussion by the single word "Arctic." The two regions will be treated separately, however, where differences in terrain indicate varying requirements.

Arctic Mountains

Although the Arctic as a whole is predominantly low and flat, mountains are common throughout the entire area. Mountains in northeast Siberia, the Alaska, Brooks, and Richardson Mountains of North America, the Scandinavian Peninsula, and the mountain borders of the USSR are all rugged.

Many of these mountains are perpetually snow-covered and have a lower permanent snow line than those in the Temperate Zone. Even in the summer, conditions of snow and extreme cold are often experienced. A case in point is the Alaska Range, which is interspersed with plateaus, valleys, glaciers, and tall, sharp peaks that are the highest to be found in the arctic regions of the world. Stretching latitudinally across southern Alaska, this range lies approximately 40 miles south of the Big Delta military reservation. In this particular area, it reaches its greatest height in Mt. Hayes (13,740 feet).

Glacier Training

Typical of the ice fields in the region is the Black Rapids Glacier, which serves as the school's main glacial training area. This glacier, which is famous as a result of the sensational advance of more than 4 miles it made in the winter of 1936-37, covers an area of about 150 square miles.

Perhaps it should be remarked that although glaciers are prominent in most northern mountain ranges, and particularly those of the North American Continent, they are less common in some arctic regions. For example, according to N. T. Mirov (*Geography of Russia*), at present there are almost no glaciers in the mountains of northeastern Siberia. Only a few small glaciers have been discovered and these are constantly shrinking in size.

The extent to which military forces will operate in the mountains of the Arctic in any future war obviously cannot be predicted at this time. Notwithstanding, in its determination to ignore no significant aspect of the Arctic, the school devoted roughly a fourth of each 4-week field exercise to mountain movement in the Alaska Range. As a result of this experience, it was learned that, if troops are forced to fight in this type of terrain, they must be prepared to utilize high mountain techniques and to operate, occasionally, in severe weather. Although training in the basic principles of military mountaineering, as taught in Field Manual 70-10, *Mountain Operations*, dated September 1947, will normally suffice to prepare troops, some specialized instruction in route selection and movement over glaciers may be necessary. True, glaciers at times present formidable obstacles to movement and, if this is the case, are

Long concerned with mobility in the Arctic in winter, today our Army is tackling the greater problem of movement in summer, when frozen routes disintegrate and lakes, streams, and swamps impede operations

better avoided. Nevertheless, since their surfaces are often more favorable for movement than the surrounding heights, they can be successfully exploited by trained soldiers and a commander who knows how to use them.

Vegetation an Obstacle

A prominent obstacle to movement peculiar to subarctic mountains is their vegetation. In the mountains of the Alaska Range south of Big Delta, for example, an abundant growth of alder clings to the lower slopes. This vegetation grows so thick and tangled that movement through it is extremely difficult. Oftentimes, a trail must be cleared by machete to permit the passage of troops. Most peaks, of course, extend above the timberline, where low shrubs, mosses, and lichens offer little hindrance to movement. Northward, mountain vegetation presents a decreasing problem, for here the tree line progressively lowers until forests disappear altogether, giving way to the arctic tundra.

Road Construction

Except where roads have been constructed through the passes, the operation of wheeled and tracked vehicles in the mountains is extremely limited. Road construction itself is complicated by the steep slopes and cliffs, turbulent glacial fed streams, and heavy deposits of rock—both bedrock and glacial moraine. Such a great amount of engineer support is required to build roads that it cannot be justified unless a very large force is involved.

For use as a main supply route during the mountain phase of the training, the school fortunately had access to an excellent road—the Richardson Highway, which traverses the Alaska Range south of Big Delta. This road, which provides one of the few land routes connecting the southern coast of Alaska with the interior, supports all types of vehicular travel.

Air Supply

To move supplies off the road, however, it was necessary to rely principally on man-carry, supplemented, when weather conditions and the availability of aircraft permitted, by air supply. Parachute drop by *C-47s* of the Air Force's 10th Rescue Squadron was especially effective in establishing a base camp on the upper reaches of the Black Rapids Glacier and, subsequently, in resupplying the reinforced rifle company of the 4th Regimental Combat Team which participated in the tactical problem that concluded each field exercise.

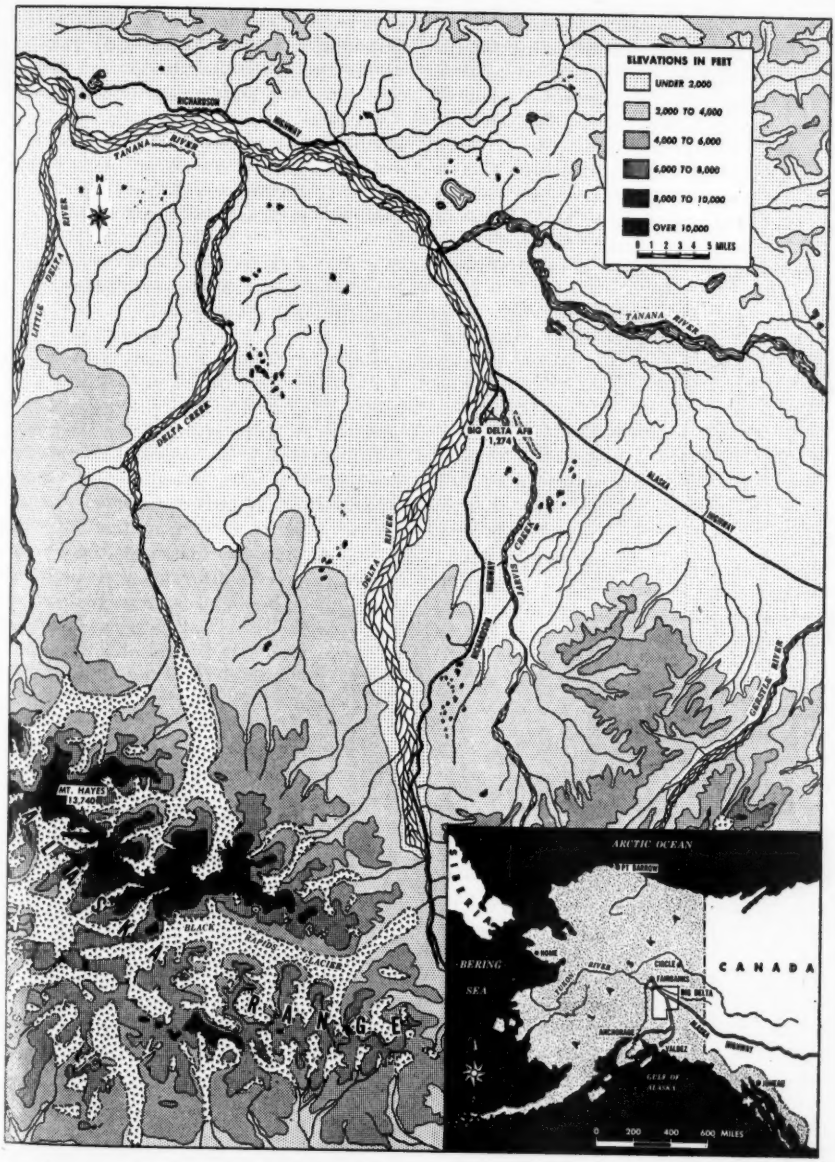
Although helicopters were not available for trial, unquestionably they would have saved a great deal of time and effort in transporting troops and supplies to and evacuating casualties from terrain otherwise accessible only on foot.

Vehicle transport over the northern glaciers, many of which are the active type with large crevasses, is normally impractical. Perhaps the greatest barriers to movement are the huge ridges of rock debris—the lateral and medial moraines. Furthermore, as in the case of the Black Rapids Glacier, the face of some glaciers is so steep that it is virtually impossible for vehicles to gain access to their surfaces.

Pack Animal Transport

Training operations conducted in arctic mountains to date have pointed up the possibility of exploiting one other means of transport—pack animals. In fact, based upon the need it experienced for pack animals, the school has recommended that the use of horses or mules in summer arctic operations be thoroughly investigated.

Horses are considered to be one of the most practical means of transport during the summer and the winter in countries like Norway, Finland, and the Soviet Union. In Alaska, horse pack trains have long been used during the summer—by geological survey topographic parties, by hunting parties, and by prospectors—and have proved especially useful in the mountain and highland regions, where footing is good and forage plentiful. One of the


ELEVATIONS IN FEET
UNDER 2,000
2,000 TO 4,000
4,000 TO 6,000
6,000 TO 8,000
8,000 TO 10,000
OVER 10,000
0 1 2 3 4 5 MILES
RICHARDSON HIGHWAY
TANANA RIVER
LITTLE DELTA RIVER
DELTA CREEK
BIG DELTA AFB
1,374
ALASKA HIGHWAY
DELTA RIVER
GERSTLE RIVER
MT. HAYES
13,740
BLACK
SURPRISE
GLACIERS
ARCTIC OCEAN
BARROW
BERING SEA
NOME
YUKON RIVER
CIRCLE
FAIRBANKS
BIG DELTA
ANCHORAGE
VALDEZ
GULF OF ALASKA
CANADA
0 200 400 600 MILES

chief objections raised to this method of transport is the problem of caring for the animals in the winter months, when, as a result of the snow, little use can be made of them. Horses have wintered for years on the sandbars of some of the streams, where, like the buffalo, they are able to get sufficient food to live from one summer season to the next. It is doubtful, however, if these bars can support the number of horses required for even a small military operation.

Mules can be employed in the same manner as horses, but, since they are more sensitive to extremely low temperatures, they require more special attention in winter.

The Highlands

Bordering the high ranges of the Arctic are the lower mountains or foothills—the highland regions, which are characterized by smooth-topped hills and gently sloping surfaces. Soil trafficability is generally good for travel by man, animal, and vehicle. Aerial survey of the highlands extending from the Alaska Range north toward Big Delta, for example, reveals fairly well defined trails winding across the wooded glacial moraines and treeless plateaus—evidence of the success that early prospectors had in moving overland in this region. These particular highlands vary from 6 to 12 miles in width.

In negotiating the highland plateaus, the school succeeded in using both wheeled and tracked vehicles, and oftentimes without improving the selected route. The scarcity of trees on the plateaus enhances movement, but it presents a hazard from a tactical standpoint, a factor which becomes critical during periods of continuous daylight. Because the soil is predominantly gravel, road making, if required, is comparatively easy: one pass of a bulldozer will usually clear and level a route sufficiently to provide a rough roadway.

For any extensive cross-country movement in the highlands, however, a tracked vehicle such as the *Weasel* was required. The chief obstacles encountered were the deeply cut valleys of the glacial streams that cross the highlands, the soft ground along the base of hills, and the huge granite boulders that are strewn profusely over some parts of the area. With careful route reconnaissance, the majority of those obstacles that could not be traversed by a *Weasel* were successfully bypassed. Most of the streams, for instance, afforded many places suitable for fording.

The Lowlands

Adjacent to most highland areas of the Arctic are lowlands—undoubtedly the most extensive feature of any arctic land mass. In the Big Delta district, the lowlands are represented by the Tanana River Valley. Here, near the junction of the Alaska and Richardson Highways and at an elevation of 1,274 feet, the Big Delta Air Force Base is situated. At those points where the rivers from the Alaska Range leave their highland valleys to cross it, the Tanana River Valley is characterized by low, irregularly shaped hills and ridges formed by glacial moraines, interspersed with many small ponds and lakes. The majority of the area, however, is flat, with scarcely any relief.

It is interesting that the lowlands, which so favor mobility in the winter, present the greatest movement problems in the summer. It has been said that the main transportation difference between the summer and the winter in the Arctic is that you can walk on water only when it is frozen. In any event, in the summer the ground thaws to a depth varying from a few inches to as much as 6 or 10 feet; and since the underlying permafrost prevents effective drainage, extensive areas of swamp and muskeg result. The dominant soil consists of nothing more than a base of very soft mud covered with a thin layer of moss and lichens. Once the moss layer is punctured, there is no support until the permafrost is reached.

Troops forced to fight in arctic mountains must be trained in the fundamentals of mountaineering. Above, instructors at the Army Arctic Indoctrination School demonstrating the use of the suspension traverse to move personnel and supplies over difficult terrain. Below, students climbing the Black Rapids Glacier.—Department of Defense photos.

Vegetation Aids Travel

Over most of the lowlands there is a thick cover of vegetation. Because of the warm, moist climate, coniferous forests thrive along with a considerable admixture of leaf trees such as aspen, willow, and birch.

Largely because of the water saturated soil, the stagnant swamps, the vast expanses of grass hummocks or niggerheads, and the thick stands of insect-infested brush and timber that characterize the lowlands, the sub-Arctic in the summer is often likened to the jungle. Travel on foot is slow, and it exhausts troops in a surprisingly short time. Sometimes the going is hazardous, as when moving over floating bogs—matted vegetation and rotted vegetable matter which float in water-filled depressions and along the shores of lakes. Although these bogs will usually support a man, they are sometimes so unstable that troops may have to use skis or snowshoes to achieve sufficient flotation to cross.

For transporting supplies over boggy ground, students found such a field expedient as a log trail highly useful. Long used by Scandinavian and Siberian natives, the log trail is quickly built by placing two trimmed logs side by side on the ground; if the soil is excessively soft, two sleepers are placed underneath them. In World War II, log trails extending many miles in length were used with great success by the Finnish Army in East Karelia to back-pack food and ammunition to outposts and separate islands of resistance.

Pack Animals and Vehicles

Although pack animals are impeded by wet, swampy ground, this means of transport may be used to a limited extent if routes are carefully reconnoitered. Mules are less efficient than horses in this type of terrain because they have relatively smaller hoofs and thus sink into the soft ground more easily.

Wheeled vehicles are confined almost entirely to well-prepared roads, but low ground pressure tracked vehicles—the oversnow vehicles of winter operations—have a freedom of movement limited only by swift, unfordable streams and dense woods. The operation of the *Weasel*, our presently standard oversnow vehicle, should never be attempted anywhere, of course, in currents of more than 2½ miles an hour. *Weasels* have relatively little trouble breaking trail through those subarctic forestlands which, as exemplified by those in the vicinity of Big Delta, were burned off years ago and which, as a result, are now covered with a young growth. However, in more heavily forested areas, where trees are closely spaced and obstacles known as "blowdown" or "windfall" exist, their movement may be stopped altogether.

With heavier vehicles, such as tanks, care must be taken that the vegetative mat that covers the soft, waterlogged soil is not broken or equipment will become mired. The fewest vehicles possible should follow in the same track; in very soft spots, each vehicle should make its own track. When this is impossible, reinforcement of the route with brush, or the construction of tread, corduroy, or corduroy fascine roads, may be necessary. Although the number of man-hours involved in such work is high, considerable trouble may be avoided: for once a tank sinks in muskeg, recovery is extremely difficult.

It is emphasized that the problems of traveling through the subarctic bush in the summertime vary somewhat from those encountered on the tundra plains of the true Arctic. For one thing, the summers of the Arctic proper are shorter and colder and thus are not conducive to the growth of trees. Although the climate does support grasses, dwarf birch, and willows, this vegetation presents no substantial barrier to movement. On the other hand, swampy areas—again attributable to permafrost—may be more widespread in the

Although glaciers at times are formidable obstacles, their surfaces are often more favorable for movement than the surrounding heights. Above, students moving along the surface of the Black Rapids Glacier during a route selection problem. Below, students ascending a scree slope during a mountain movement problem.—Department of Defense photos.

Arctic than in the sub-Arctic, particularly in the more northerly latitudes.

Inland Waterway Transportation

Because of the lack of roads and the poor soil trafficability in the arctic lowlands, the rivers that flow through them often afford the best transportation routes. Largely as a result of this fact, water transportation has played an important part in the history of arctic settlement. In 1898 alone, homemade boats carried 20,000 men down the Yukon River to Dawson City in the "Klondike-or-bust" procession. Today, the Yukon and the McKenzie Rivers systems, together with existing rail and road facilities, provide access to the major portion of the inland areas of the western Arctic during the summer months. Even during World War II, the United States Army moved large numbers of troops and huge tonnages of supplies down the Yukon River, on wood-burning sternwheelers and barges, from Whitehorse, Canada, to Circle, Alaska, from where they were transported overland to Fairbanks and other points.

Although inland waterway transportation in the Arctic has most of the disadvantages of this type of transportation in the Temperate Zone, there are some differences. The inflexible characteristic of inland waterways—that is, the fact that their routes are fixed and cannot be moved to meet tactical requirements—is very evident in the Arctic, as the Eskimos first discovered when they found that the caribou do not obligingly travel along rivers or lake shores, but tend to stay on the open plains far from the large water courses. However, because travel cross country, let alone on roads, will seldom be possible, circuitous movement by waterway becomes less of a disadvantage.

A disadvantage that is more marked in the Arctic is the difficulty, because of the scarcity of population, of obtaining qualified civilian operators. The sub-Arctic, for example, has a population of less than two persons per square mile, and there are even fewer inhabitants in the Arctic proper. Thus, the saving of military personnel that is normally obtained in the operation of inland waterways will be decreased considerably. Also, native equipment may not be available in sufficient quantities to support even a small operation. As a consequence, it may be necessary to maintain reserves of standard equipment for use when needed, a requirement which might seriously increase the strain on a supply system that is bound to be overburdened.

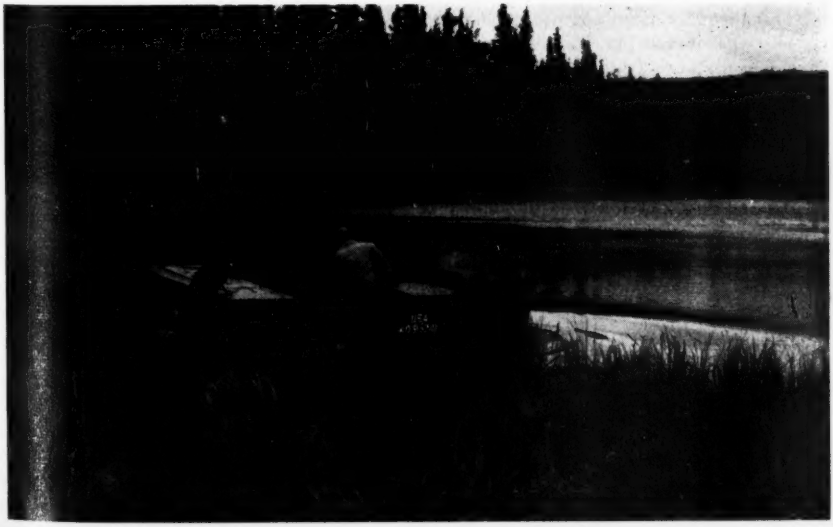
Just how much of a strategic role inland waterway transportation will play in any future war in the Arctic will depend on future developments and the availability of other means of transport, one of the most important of which is aircraft. If, however, waterways and other requisite facilities exist in an arctic theater of operations, and if this means of transport proves practical, an inland waterways service will, in all probability, be operated by the Transportation Corps.

Tactical Movement

In its work, however, the Army Arctic Indoctrination School was concerned with water transport in a somewhat different role—in the movement of troops and supplies of small units in close support of tactical operations. This concept envisages equipping tactical units with boats, when the situation demands, to replace or supplement organic wheeled and tracked vehicles.

There are several unusual conditions affecting the use of small boats in this type of operation. Streams are fast, prevailingly shallow except during floods, and filled with obstructions such as sandbars and log jams. Also, frequent portages may be necessary. Thus, boats must be strong enough to withstand rigorous use, yet light enough to be handled by the crew at portages. To meet this requirement, Army Field Forces is currently engaged in developing a family of small boats for

When the soil is soft and waterlogged it may be necessary to construct log roads to permit the uninterrupted passage of vehicles. Above, students attending a summer arctic indoctrination field exercise watching the construction of a log road. Below, a *Weasel* crossing swampy terrain typical of the arctic lowlands.—Department of Defense photos.



use in arctic waterways and, toward this end, a number of tests have been conducted by the Arctic Test Branch, which is also located at Big Delta.

The school in the meantime has employed a wide variety of equipment, ranging from the standard engineer assualt and storm boats to a number of specially designed native craft. Both are sources that could readily be exploited in an actual operation. While the engineer boats were found to have only a limited application, the locally procured Tanana freight boat, a 30-foot, flat-bottom, plywood craft powered by a 22-horsepower outboard motor equipped with a lift to raise the motor over obstructions in the water, proved extremely useful. Having a payload of 4,400 pounds, this boat will carry a nine-man rifle squad and all its combat gear, plus a boat operator, in all types of water. Another native craft, the Yukon river-boat, also of plywood construction, but powered by a 60-horsepower inboard motor, also showed tremendous possibilities for military transport.

In spite of the many apparent shortcomings of water transportation and a lack of adequate standard equipment, the school was unable to operate any appreciable distance from the existing road net in the Tanana Valley without resorting to this method of movement. Training in this phase of arctic indoctrination included a practical navigation exercise of a 100-mile stretch of the Tanana River and its tributaries. And, as a final demonstration of the application of water transport, boats were utilized in the 4-day tactical problem that concluded the exercise. Following an advance to contact through the lowlands—first by 2½-ton truck, then by *Weasel* and on foot—a reinforced rifle company, to include all its weapons and equipment except vehicles, was transported by water a distance of 10 miles to an assembly area that could not have been reached in any other manner except by helicopter. Also water-borne was the student body, which acted as an Aggressor detail, umpires, and observers. This move, which was protected by aircraft on column cover, was accomplished in slightly more than 4 hours by shuttling 10 Tanana freight boats.

Reconnaissance

In order to avoid misdirection of effort and a consequent loss of time and fatigue of troops, movement throughout the Arctic must be preceded by thorough, detailed reconnaissance. Since ground reconnaissance is complicated by such factors as the lack of relief in the lowlands and the rugged terrain in the mountains, aerial photo and visual reconnaissance assume increased importance. Organic Army aviation, either rotary or fixed-wing aircraft, is particularly valuable in assisting the commander in making a personal reconnaissance. When light aircraft are equipped with floats, the multitude of lakes throughout the lowlands provide excellent landing fields.

Logistics

Probably the greatest lesson learned by the school as a result of the summer field exercises is that the logistical requirements for a summer arctic operation differ widely from those for support of a winter operation. Not only do items of equipment vary, but there is an urgent need for prior planning to ensure that those items required are on hand at the proper time and place. This is especially true in the field of transportation. Many examples can be cited. When the ice goes out, floats must be substituted for skis on Army aircraft. Also, boats and motors must be made available to using units and in sufficient time to permit the training of operators and maintenance personnel. In this connection, it should be stressed that the conditions under which boats and motors operate in the Arctic result in considerable wear and tear. Repairs and replacements require detailed supply plan-

Cross-country mobility in the Arctic is achieved by employing various combinations of transportation, two of the most important of which are air and water. Above, an *L-5* and Tanana freight boats being used by students during an exercise. Below, students loading Tanana freight boats prior to a navigation exercise.—Department of Defense photos.

ning. In addition, the effects of winter storage result in a high incidence of wear. Equipment left in storage the previous season cannot be relied upon to be serviceable for use the following year. Prior inspection and notification of condition is necessary. Only by these and many similar preparations will a commander be able to make the transition from winter to summer operations smoothly and efficiently.

Conclusions

All pointing to the fact that military operations can and will succeed in the Arctic in the summertime, the following conclusions were reached by the Army Arctic Indoctrination School as a result of experience gained during the conduct of the summer arctic indoctrination field exercises:

1. Operations during the summer in the Arctic bear a striking resemblance to operations in other undeveloped regions of the world—especially the jungle.

2. Travel in the Arctic in the summer has certain real difficulties, but, for the most part, these difficulties can be overcome by understanding them.

3. The complexity of arctic terrain and the obstacles it presents to movement demand that troops be trained to exploit the advantages of local conditions to the maximum, and to reduce the disadvantages as far as possible. They must be fully capable of employing the various combinations of air, foot, water, pack animal, and wheeled and tracked vehicle transportation necessary to achieve cross-country mobility.

4. Since the areas which are accessible by road are extremely limited, the rivers of the Arctic are important militarily for the movement of troops and supplies.

5. The fact that rugged mountain regions exist throughout the Arctic indicates that mountain fighting may play an important part in summer arctic operations. Troops forced to fight in these regions must be trained in the fundamentals of mountain movement.

6. With the exception of the need for a family of small boats, a requirement Army Field Forces is currently engaged in meeting, existing equipment is adequate for summer arctic operations.

7. Air transport will greatly facilitate supply and evacuation and will often be the only practicable method available. Its use must be exploited to the maximum.

8. A prerequisite of successful movement in the Arctic is thorough, detailed reconnaissance. Because of the difficulty of overland travel, this reconnaissance must be performed by air whenever possible.

9. Coupled with a knowledge of terrain, the attainment of mobility in the Arctic demands a thorough understanding of the logistical problems involved. Logistical support must be flexible in order to provide the combat force with the equipment needed at the right time and place. Requirements must be anticipated and provision made for all contingencies.

MILITARY NOTES AROUND THE WORLD

UNITED STATES

Missile Speeds

Tremendous new missile speeds, one of which theoretically equals 235 times the velocity of sound at sea level, are being produced in American laboratories.

These fantastic speeds produce effects rivaling those of meteors. They are beginning to tell scientists some of the difficulties they will face when and if they get around to space rockets.—News release.

Torpedoes for Merchantmen

New American merchant ships now going into operation will be able to fight submarines with the submarine's own most deadly weapon—the torpedo.

Moreover, this torpedo apparently will be one of the ultramodern "target seeking" type which seeks out, tracks down, and blasts an enemy vessel either on or below the surface.

The plan for self-defense of the hitherto helpless merchantman came to light in a shipbuilding company's description of the new and past mariner-class vessels. The publication reported that the new merchant ships will have reinforced deck sections for gun platforms, an area from which submarine-spotting helicopters can be launched and recovered, and "provision for the installation of torpedo-launching equipment."—News release.

Fuel Burner

In 1 hour, two jet-powered fighters use up as much fuel as an entire piston-engine fighter squadron did in World War II.—*Aviation Age.*

Reserve Training Program

The Air Force has announced that it will funnel about 250 airplanes—outmoded fighters, trainers, and troop carriers—into the re-establishment of its reserve training program this year.

The Air Force's reserve training program was discontinued after the outbreak of the Korean conflict stripped the organization of its planes and men.

According to the announcement, 22 reserve training centers will be set up. Each center will comprise a wing with an authorized strength of about 1,500 men.—News release.

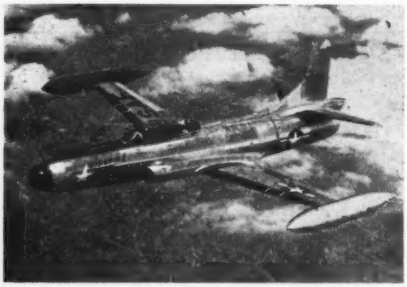
External Fuel Tanks

All fuel for the *C-119H Skyvan* is carried externally. Two large external wing tanks, similar to the 1,780-gallon tanks for the *B-47B*, are permanently attached, and replace 22 internal wing fuel cells of earlier *C-119* models. In addition to a weight saving of 600 pounds, greater safety is claimed.—*The Aeroplane*, Great Britain.

First All-Rocket Plane

American air power's latest answer to air invasion—an almost automatic jet warplane armed with radar and rockets—is now in production. The new plane is the *F-94C Starfire*, built for the United States Air Force.

The first United States fighting plane ever to have an all-rocket armament, the



The Air Force's new all-rocket *Starfire*.

F-94C carries twenty-four 2.75-inch rockets housed in a ring of firing tubes around the nose.

Radar and specialized "brain-like" instruments enable the *Starfire* to spot the enemy miles away, lock onto the target, and track, close, aim, and open fire—all by itself.

The interceptor-type plane's specific mission is to knock out invading bombers.

The *F-94C* is one of the world's fastest climbing jet airplanes in ascending to 45,000-foot bomber invasion lanes. Its top speed is reported to be "more than 600 miles an hour."

Besides the main nose-rocket battery, the *Starfire* can carry additional fire power in underwing attachments, called pods, housing rockets. Bombs up to 1,000 pounds or napalm tanks can be carried under the wings in lieu of wingtip fuel tanks.

Its statistics include: take-off weight, more than 20,000 pounds; length, 41 feet, 5 inches; span, 37 feet, 6 inches; and height, 13 feet, 7 inches.—News release.

Antiaircraft Guns

The Military Sea Transportation Service has announced that, in line with a program announced more than a year ago, it is fitting its military freighters and tankers to carry 40-mm antiaircraft guns. —*The New York Times.*

Portable Pipe Line

A new portable fuel supply "pipe line" has been developed for the Army.

Intended for delivery of gasoline and other liquid fuels to forward dispensing points, the developmental hose line may in the future provide means for rapidly transporting bulk supplies in the quantities required by combat elements of the armed forces.

Tests indicate that this type of "pipe line," consisting of the world's lightest weight gasoline hose, can be laid from a vehicle at rates up to 15 miles an hour. One such hose line can transport 41 tons of material an hour, 24 hours a day, regardless of weather or road conditions. Its daily capacity is equal to that of 162 2,000-gallon tank trucks.

The hose line not only eliminates this additional load from the road net but provides an economical method of transportation at considerable savings in personnel and equipment.—News release.

New Packaging Container

A new type of metal container has been developed for packaging flares, fuzes, and similar defense items.

The new cylindrical container features a radical departure in closure-treatment. Based upon the old Mason jar principle, a threaded collar is attached to the body of the container. A threaded cover, in which a pressure dome and rubber gasket have been incorporated, fits the collar for airtight sealing. The chief advantage of this container is the fact that it may be readily resealed after opening.—*Army Navy Air Force Journal.*

Landing Craft

Contracts have been awarded for the construction of 518 landing craft, mechanized (LCMs), at an approximate cost of 17½ million dollars. The Army Transportation Corps will receive 514 of the craft, while 4 are being procured for Turkey.—*Army Navy Air Force Register.*

Educational Level Rises

Americans have more education than ever before, according to data compiled in taking the last census.

Among the 87,675,000 Americans aged 25 or more, 7 of 10 had finished elementary school, 1 of 3 had finished high school, and 1 of 16 was a college graduate.

The younger people generally had more schooling than their elders. For example, 18 percent of those in the 25-29 age group had completed at least a year in college, although for many of them the war had meant an interruption of their schooling.

The lesser educational opportunities in the old days were evidenced in the following:

The average person of 65 or more was an elementary school graduate. In the 40-44 age group the average person had completed 2 years of high school. In the 25-29 group the average person was a high school graduate.—News release.

Comforter Sleeping Bags

Contracts were awarded recently for the manufacture of 242,000 comforter sleeping bags to replace the standard wool sleeping bag (MILITARY REVIEW, Jun 1952, p 64).

The new bag consists of a water-repellent, wind-resistant case of cotton fabric filled with specially processed chicken feathers to provide insulation. No wool is used. Unlike the sleeping bag currently in use, the new bag is complete in one piece, requiring no additional outer cover. It also is reported to be twice as warm as the present wool bag.—*Armed Force.*

New Helicopter

A new helicopter that more nearly resembles a conventional plane than any rotary-wing aircraft flying in this country—the Gyrodyne Model 2c—is undergoing flight tests for the Department of Defense.

Lift and thrust are provided by two tapered coaxial rotors mounted one above the other, one turning clockwise and the other counterclockwise.

The rotors measure 48 feet in length. The lower one is so high above the top of

The Gyrodyne Model 2c in flight.

the fuselage—8 feet—that crews, passengers, and service personnel on the ground do not have to duck or stoop to avoid the whirling blades. There is no tail rotor to counteract torque.

More or less conventional tail control surfaces take the place of the small tail rotors of ordinary helicopters. The advantages of this arrangement are that all the power from the engine goes to the main rotors; there is one less part of the machine subject to potential failure; and there is no danger to persons on the ground from the small blades.

Powered by a 450-horsepower engine, the helicopter can carry a pilot and six passengers, or, in military use, a pilot, a medical attendant, and three litter patients.

It has a ceiling of 15,000 feet, a rate of climb of 1,000 feet a minute, and a forward speed of 87 knots.—News release.

Jet Transport

The Air Force has scrapped the *C-123A* —a jet powered version of the twin-engine *C-123* assault transport and first United States cargo type aircraft to fly with jet power (MILITARY REVIEW, Aug 1951, p 63).

The cancellation does not affect plans for the production of the piston-engine version. The *C-123A* started as a glider project, called the *G-20*. It was later powered with two *J-47* turbojets and successfully test flown.—*Air Force.*

C-131 Transport

The Military Air Transport Service (MATS) will receive initial delivery of a twin-engine, pressurized, medium-type transport early next year.

The plane, designated the *C-131*, is a military medical air evacuation version of the commercial Convair *240* transport.

The addition of the *C-131* to the MATS fleet will enable the service to transfer its *C-47s* and *C-54s* from domestic air evacuation to other airlift missions at United States and oversea bases.

The *C-131* will accommodate 27 litter or 40 ambulatory patients.—News release.

National Guard Units

The Chief of the National Guard Bureau has announced that about 1,700 Guard units have been called to active duty since the beginning of the Korean conflict.—News release.

Vibration Damper

A new vibration damper, which eliminates practically all the vibration previously existing in the helicopter control stick, is now being incorporated into the *H-23* and *HTE* helicopters.

The chief characteristic of the new device is the smoothness it provides to the control stick, which is comparable with that of a fixed-wing airplane and should greatly reduce pilot fatigue.—*American Helicopter.*

Rangefinder for Tanks

A tank gunner's chances of zeroing in on a target and making his first shot a hit have been greatly increased by a new optical device developed for the *M47* medium tank.

The new optical device quickly calculates the distance to the target, thus allowing the tank gunner to get off a round before the enemy can accurately calculate his position.

The development is a complex rangefinder of precision optical, electronic, and mechanical systems. Data on the range and speed of the target, as well as the type of ammunition the rangefinder is set for, are automatically applied to the tank gun.—*Army Navy Air Force Journal.*

New Radar Set

A new lightweight radar set that "maps" every detail of terrain and weather obstacles up to 200 miles in front of an aircraft is now in production for the Navy and the Air Force.

The new unit permits the pilot to see a close-up of a selected area as if he were using a powerful telescope that could penetrate through darkness and clouds, and can be used for the following four general types of operation:

1. As a means of collision warning. It will show mountains and in some instances aircraft in the vicinity.

2. As an accurate indicator of weather conditions. It will show the position of thunderheads and other cloud formations, and will enable the pilot to avoid turbulent weather or select the safest course through it.

3. As a means of position location when standard landmarks are not visible. It can pick up the signal of ground based radar range units.

4. As a means of mapping terrain. Through a special discrimination circuit, it shows the pilot the salient characteristics of the land over which he is flying.—*Army Navy Air Force Journal.*

Army ROTC Units

The Army Reserve Officers' Training Corps has been expanded to include an additional 25 colleges, bringing the total to 261 schools, and increasing the present enrollment of 126,000 by about 5,000.—*Report to the Army.*

Push-Button Rifle Range

The Army's first rifle range to be operated completely by electronics has been installed at The Infantry School, Fort Benning, Georgia.

The range—where soldiers fire at quick-moving, man-size targets—saves money and manpower, increases range efficiency, and puts more realism into the various firing exercises.

Some 36 targets pop up when switches are flicked, and they fall when a bullet pierces electrified sheets of screen inside the target. Both movements are powered by a small motor.

Manually operated ranges are staffed by about 60 men, who stand in pits and raise targets by hand and lower them to check the hits. The new range uses only 10 controllers to flip the switches.—News release.

Jet Airliner Planned

The Douglas Aircraft Company has undertaken the development of a jet-propelled airliner with a speed of nearly 600 miles an hour.

The project is the first in this country, as far as is known, to have reached a definite status, although several manufacturers have talked speculatively of producing such a plane. A British jet transport, the 36-passenger De Havilland *Comet*, went into commercial operation this year (MILITARY REVIEW, JUN 1952, p 71).

The Douglas plane, informally called the *DC-8*, would have a capacity of up to 80 persons. This is tentatively scheduled for about 1956 or 1957.—*The New York Times.*

JAPAN

Ship Loan

The United States has authorized the loan of 10 patrol frigates and 50 landing craft to Japan so that that country can resume patrolling her own coasts. The loan is for a period of 5 years, plus 5 additional years at the request of the Japanese Government.—News release.

TIBET

Tibet-India Road Planned

The Chinese Communists in Tibet are planning to build a 160-mile motor road on the present Indo-Tibet caravan route from the 14,000-foot Natu Pass on the Indo-Tibet border to Gyantse, Tibet's third largest town, and thence to Lhasa.

Some 2,000 Chinese troops have been briefed for assignment, and the first group of 500 soldiers has left for the Indo-Tibet border to start work.

The new road is expected to reduce considerably the time necessary to move goods and food supplies from China to Tibet through India.—*The New York Times.*

KOREA

War Dogs

The Army's K-9 Corps has been credited with reducing battle patrol casualties by 60 percent in Korea.

Experience has proved that patrols can penetrate deeper and move faster with less risk of casualties when they are spearheaded by dogs.—*Army Times.*

Fresh Food

Troops in Korea receive more fresh fruits, meats, and vegetables than their World War II counterparts in Europe, according to the Army Transportation Corps. There is a threefold reason: (1) increased "reefer" vessels for the Far East run; (2) floating cold storage barges at Korean ports; and (3) refrigerator car service on the Korean National Railway.—*Report to the Army.*

SWITZERLAND

Rearmament Program

Swiss voters recently defeated a proposal to raise 345 million dollars for heavier rearmament through increased taxes on income and beverages. The defeat of the taxation measure will force the Government to formulate an entirely new program to cover the costs of its 5-year rearmament program.—News release.

DENMARK

United States Embassy

Work has begun on the construction of a new United States Embassy in Copenhagen. The building will cost about $700,000 and is expected to be finished in 1953. It will house all offices, the information service, library, and lecture hall which are now in different parts of the city.—*The New York Times.*

Nuclear Unit Planned

Eminent atomic scientists from 10 European nations disclosed plans recently to build the world's largest nuclear research laboratory in either Denmark or Switzerland.

The project will be a co-operative venture of France, Western Germany, Italy, Belgium, the Netherlands, Switzerland, Denmark, Norway, Sweden, and Yugoslavia.

The laboratory will contain the world's largest cosmotron—an atom-smashing machine—and will take 7 years to build. The cost will be about 14 million dollars.—News release.

PORTUGAL

Independent Air Arm

Portugal is to have an independent air force under the Ministry of Defense. The action will abolish the separate Army and Navy air arms. Although its actual strength will still be small, Portugal has pledged to build up its air arm under North Atlantic Treaty Organization commitments.—*The New York Times.*

TURKEY

Economic Development Loan

Turkey recently received a loan of more than 25 million dollars from the World Bank to help develop a farming and industrial area in south-central Turkey, the Adana Plain. The money will aid in financing a dam for irrigation and power facilities on the Seyhan River.

The new loan makes a total of more than 50 million dollars advanced by the World Bank for Turkey's economic development. The other loans were made in 1950.—News release.

THE NETHERLANDS

New Type Submarines

The Netherlands Navy is constructing four submarines of revolutionary design which it is said will prove a far more dangerous assault weapon than any other contemporary underwater craft.

The novelty is in the design of the hull. Instead of the standard cylinder shape, the new submarines will consist of three cylinders. A large one will house the crew and armament, and two shorter ones, set aslant beneath it, will contain batteries and diesel engines.

This new layout is expected to provide more space and speed with less weight and size.—News release.

NEW ZEALAND

Inspecting Island Defenses

Great Britain and New Zealand are checking the defense of their vital chain of South Pacific Islands.

A mission representing the New Zealand Army, Navy, and Air Force is inspecting Commonwealth-administered Tarawa, Fiji, Funafuti, Tonga, Western Samoa, and Rarotonga. All of the islands except Western Samoa and Rarotonga are under British administration.

Most of the islands were either occupied by the enemy or menaced during the Japanese advance in World War II.—News release.

GREAT BRITAIN

Plastic for Navy Caps

The Admiralty is carrying out experiments with a white plastic for naval caps. If successful, the new white-topped caps will replace the present cloth caps—blue in winter, white in summer—which have been regulation Royal Navy wear for years.—News release.

Military Strength

More than half of the British Army now consists of men called up for their 2 years' compulsory service in the armed forces.

Every year Britain calls up about 175,000 men for universal military training. Most of them go into the Army. After serving their 2 years, they have to serve for an additional 3½ years in the reserve or auxiliary training forces.

It is estimated that more than a million men are now in this "reserve army" of fully trained men (not counting the 5 million veterans of World War II). As the total of Britain's armed forces is now 852,000, this means that Great Britain has approximately 2 million fully trained men ready for action.—British Information Services.

World's Largest Floating Dock

The world's largest floating dock, lying at the bottom of the Johore Straits with a 14,000-ton Japanese cruiser in her basin, is to be refloated and towed to Britain for breaking up.

The 24,750-ton dock, capable of holding a 50,000-ton ship, was scuttled by the British to prevent its falling into Japanese hands before the fall of Singapore.

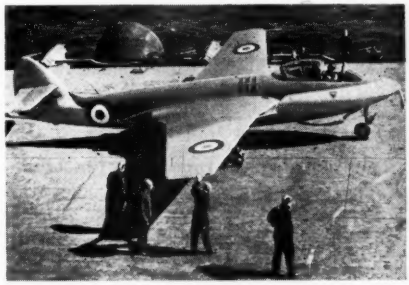
The Japanese refloated it, but allied bombers sank it again with the Japanese cruiser *Shiretoko* in her basin. The dock has lain in the strait between Singapore and the Malayan mainland ever since.—News release.

Defensive Germ Warfare

The Admiralty reported recently that scientists and engineers were carrying out secret research off the coast of Scotland in the combating of germ warfare.—*The New York Times.*

Eagle Tests Hawk

The new British aircraft carrier HMS *Eagle* recently tested the Hawker *Sea Hawk*, the Royal Navy's first folding-wing jet interceptor. Designed primarily as a



A *Sea Hawk* on the deck of the *Eagle*.

carrier-borne fighter, the *Sea Hawk* is said to combine a high top speed and rate of climb with long endurance and handling ease at any speed.—British Information Services release and photo.

Steel Program

A program to boost British steel production from 16 million tons to 20 million tons a year in the next 5 years has been announced by the British Iron and Steel Federation.

This program is designed to enable Britain to fulfill its military and civilian commitments.

Britain is currently the largest steel producer in Western Europe, but Western Germany is fast catching up. The Germans actually topped British production for the single month of March this year, and are expected to go ahead in the next few years.—*The Christian Science Monitor.*

BRAZIL

Power Plants

The Export-Import Bank has authorized a credit of more than 41 million dollars to seven electric utility operating companies in Brazil. The money will finance, with minor exceptions, the purchase of United States materials, equipment, and services for an electric expansion program with a total cost of more than 98 million dollars.—*The Christian Science Monitor.*

CANADA

Copper Agreement

A Canadian firm has agreed to sell more than 63 million pounds of refined copper to the United States Government by the end of 1956.—News release.

Aid to Europe

Canada's aid to Europe under the Atlantic Pact may be broadened to include warships.

The Defense Minister recently told the House of Commons that a 324-million-dollar estimate for Canada's Atlantic Pact program includes the possible gift of several minesweepers to European allies.

It would be the first time the Canadian Navy has figured in the aid program under which weapons, equipment, and fighter planes have been sent to Europe.—News release.

AUSTRALIA

Australian-Built Sabres

The Minister for Air has announced that the Royal Australian Air Force (RAAF) will receive the first of its Australian-built *Sabre* jet fighters early next year.

Orders have been placed locally for 72 *Sabre* jets to equip RAAF fighter interceptor squadrons. They will be powered with Australian-built *Avon* engines, which will give them higher performance than *Sabre* jets at present in use by the United States Air Force in Korea.—*Australian Defence and Services Newsletter.*

ITALY

Atlantic Pact Supply Base

The United States Army has spent nearly 8 million dollars so far in establishing a North Atlantic Pact supply base at Leghorn.—News release.

Ship Construction Contract

The United States Navy recently placed a 20-million-dollar contract for the construction in Italy of 8 corvettes and 10 landing craft. The vessels will be turned over to the United States' European allies, including Italy.—News release.

GOLD COAST

Hydroelectric Project

Negotiations have been launched to harness the 1,000-mile Volta River in a 420-million-dollar plan to make the Gold Coast one of the world's largest aluminum producers.

The Gold Coast has estimated reserves of 225 million tons of bauxite (aluminum ore), and it is believed that about a million tons of this could be processed each year into 210,000 tons of aluminum.

To achieve this, it is proposed to build a dam across the Volta about 70 miles from Accra, and install a hydroelectric plant to produce the necessary power.—News release.

INDIA

Communications Project

India is to spend more than 4 million dollars on a 5-year plan to expand telecommunication links with oversea countries.

The plan includes the opening of a new radio telecommunications station at Calcutta and the extension of existing stations in Delhi, Bombay, and Madras.

The new Calcutta station is to provide direct radio-telephone service with the United States as well as direct radio service with America and Eastern countries.—News release.

NORWAY

Aid Fund Voted

The Norwegian Parliament recently appropriated about 1½ million dollars to aid undeveloped countries. Most of the money will go to assist in the development of India's natural resources in close co-operation with the United Nations program for aiding such areas.—News release.

WESTERN GERMANY

Border Guards

Western Germany has requested allied military protection of its zonal boundary with Soviet-occupied Germany to prevent further Communist-provoked border incidents.—News release.

Rearmament Program

The cost of Western Germany's rearmament for the next 3 years has been officially estimated at more than 7 billion dollars, with the United States contribution yet to be determined.

For that sum the Germans are expected to raise 12 divisions of field troops, along with substantial supporting air and sea units, for the common defense of Europe.—*The New York Times.*

Exports Rise

West German exports have increased seven times and the free market value of the mark has gone up more than 300 percent since the June 1948 currency reform, according to a recent announcement by the Government.—News release.

Military Training Area

A former German Army training area near Hohenfels in northwestern Bavaria, and some adjoining territory, has been turned over to United States military forces for use as a training site. The new military training ground covers about 40,000 acres.—*Information Bulletin*: (Office of the US High Commissioner for Germany).

FRANCE

Atomic Project Endorsed

The Finance Committee of the French National Assembly recently endorsed a Government project to spend about 100 million dollars over the next 5 years on the development of atomic energy.—News release.

Air Base

The French Government recently turned over the Chaumont Air Base, 125 miles southeast of Paris, to United States military authorities. The base is one of an undisclosed number in Europe that will be turned over to Atlantic Pact members, principally the United States, during the coming months.—News release.

BELGIUM

United States Tanks

Belgium recently received 10 *M47 Patton* tanks from the United States. These tanks were the first of their type to be delivered to any European country under the Mutual Security Agency program.—*The New York Times.*

BURMA

Currency Change

Burmese currency switched from the Indian system to American-style decimalization recently with the introduction of "kyats" in place of the old rupees.

Each kyat will consist of 100 "pyas," but the Burman will need 5 kyats in his pocket to have the equivalent of 1 United States dollar.—News release.

EGYPT

Import Restrictions

The Egyptian Government recently took drastic action to restrict imports in an effort to preserve the country's fast dwindling sterling reserves. Among the goods put on the restricted list were soap, leather goods, automobiles, refrigerators, cotton goods, silk, radios, and furs.—News release.

INDONESIA

Military Instruction

Americans and Hollanders are teaching young Indonesians the tricks of modern warfare. Officers and men of the Netherlands Military Mission in Indonesia work on the Indonesian Army while a group of 14 American civilian flight instructors train the fledgling Indonesian Air Force.

About 100 cadets have become qualified military pilots since the American instructors started their work in February 1951.—News release.

YUGOSLAVIA

Industrial Program

Yugoslavia's ambitious industrial program for 1952 has reached the danger point through a lack of vital imports. On the basis of official figures, factories using coke have almost exhausted their supplies of fuel.

Industrial planners say that scrap and pig iron also have become a major difficulty with import deliveries less than one-third of that expected.—News release.

Soviet Howitzers

The United States is sending 35 Soviet-built howitzers to Yugoslavia. The weapons, which were captured in Korea, will be used by the Yugoslav Army as replacements and spare parts for equipment now in use.

A great part of the equipment with which the Yugoslav Army is equipped is of Soviet manufacture. This equipment is wearing out and there are, since the Yugoslav-Soviet break, no spare parts available.

The howitzers have been classed as excess captured material and are being transferred under the terms of the Mutual Defense Assistance Program. Yugoslavia regularly receives arms under the program, but this will be the first shipment of captured Soviet-made artillery. —*The New York Times.*

EASTERN GERMANY

New Radio Transmitter

The Communist Goverment of Eastern Germany has announced the completion of a 300-kilowatt radio transmitter in East Berlin, which is said to be the most powerful in Europe except for the Moscow radio. —News release.

CZECHOSLOVAKIA

Legal System Reorganized

The reorganization of the Czechoslovak legal system along Soviet lines, which would subordinate the courts to the state prosecutor "with general powers to insure adherence to Socialist legality," has been announced by the Minister of Justice.

A new state prosecutor's office will be created, the Justice Ministry will be unified and decentralized, and court jurisdiction will be separated from court administration. The state prosecutor's office will be completely independent of other units of the state, and district public prosecutors will be subject to it.

The Minister of Justice, in announcing the reorganization, defined the task of Socialist legality as the persistent and merciless fight against the class enemy and his helpers.—*The New York Times.*

SWEDEN

Television Pact

A 10-year plan to divide up the television and radio ether over Europe has been agreed to by 21 nations conferring in Stockholm. It was the first comprehensive agreement for television and very high frequency broadcasting ever reached in this part of the world.

The plan allows for the erection of 700 television stations with powers ranging from 200 watts to 900 kilowatts spaced out from North Cape, Norway, as far south as Tunis and Morocco in Africa. Eastward, there would be stations in Turkey; westward, they would be in Iceland.—News release.

FOREIGN MILITARY DIGESTS

Swiss Partisans?

Translated and digested by the MILITARY REVIEW from an article in "Allgemeine Schweizerische Militar Zeitschrift" (Switzerland) October 1951.

WITHOUT a population which is quick to rise in defense of its liberty, no national defense effort will be successful or effective. We know, with satisfaction, that the defense attitude of the Swiss people is sound and positive, and that we, in contrast with the lax military attitude of many peoples, will give proof of a definite and determined will to resist.

A Role in the Defensive Battle

This positive defense attitude has led recently to the discussion of how, in the event of war, the many forces outside the Army can be employed in a successful and effective defense effort. Since our people are aware of the fact that modern war takes over a country in its entirety, they are asking what role they should play in a defensive battle.

A Nonmilitary Organization

In this connection, the clamor has been loud for a Swiss partisan army. Such an idea, however, does not aim at the splitting up of our field army into small groups for use as partisan forces. The present idea is for a defensive underground organization composed of nonmilitary personnel. Thus, one of our monthly publications recently stated that our only answer to brutal warfare waged against a civilian population lies in "armed resistance by the entire nation, wherever and however it may be." It further stated that the people must be systematically schooled in partisan activity so that "our own partisans may know their mission before the battle."

Resistance Was Overestimated

This concept and these demands no doubt have their origin in the sincere and positive defense attitude of our people. However, such matters must also be examined to see whether they are in harmony with the interests of our national defense and our civilian population. An official expression on this subject was made by the Chief of the Federal Military Department, on 30 September 1951, when he said:

> It appears as though the value of the so-called underground movement of the civilian populations in occupied territory during the last war was overestimated, and that the fact was overlooked that the efforts on the part of the civilians to take part were followed by reprisals. The soldier in the field does not expect his people at home to expose themselves to this danger, but he knows that the civilian population in the area occupied by the enemy is carrying on courageously, is undertaking nothing that is

harmful to its own army, and is doing everything possible to assist it. On the other hand, it is the right and duty of the fighting forces, even when they lose contact with their troop units, to continue the fight with their weapons, *à outrance*, both on the front and in the occupied areas. That the civilian population will be of assistance to them goes without saying.

It is well that a formal announcement has come from such a high authority with regard to this difficult and delicate problem. Thereby, its practical discussion has been initiated. Because there is great confusion and a lack of clarity concerning the matter of civilian participation in military activities and partisan warfare, an effort will be made in this article to judge this complex problem from a somewhat broader and more comprehensive point of view.

Combat à Outrance

In judging this problem, one should start with the fact that the basic principle of combat *à outrance* applies to every member of our Army. Every Swiss soldier knows that it is his duty to offer resistance "as long as there is life in his body." This duty exists for all the troops of our Army and for all the regions of our country. The Chief of the Federal Military Department has emphasized that we are trying "to make our Army so strong and mobile that it will be able to engage in battle as close to the frontiers as possible." It would appear, therefore, that the Supreme Executive Council of State and the Army High Command are not thinking of prescribing, as a sole solution in case of war, a withdrawal into the "Redoubt." Rather, the Army is to be able and ready, first, to wage battle in the frontier zones and in the Mittelland.

No one could entertain the illusion that we would be able to prevent a major power from intruding onto our territory. Moreover, we must expect that our troops fighting on the frontier or in the Mittelland could be passed over by airborne units or broken through and torn apart by a numerically superior enemy. Since the higher and lower commands are aware of this possibility, orders have been disseminated throughout the Army to the effect that our troops are to continue to fight even when the defense front is moved back or when a continuous defense front no longer exists. Every military leader knows that even in the event of being cut off, or in the absence of further commands, this order will stand: "Continue to offer resistance! Continue to fight!"

Guerrilla Warfare

The combat form of this resistance will be guerrilla warfare, whose objective consists of attacking the enemy with all means available; with cunningness, with sabotage, from ambush, and under the protection of night.

Those who carry on this form of combat will be the cut-off portions of the Army, regardless of whether they had been fighting as frontier guards or on a defense front. They will fulfill their duty as soldiers only when they, as isolated detachments, operate in the sense of the over-all mission of the Army: "to inflict the greatest possible losses on the enemy."

Strengthening the Resistance

It will not only be the cut-off portions of the Army, however, that will be available for guerrilla action. Every commander of isolated detachments will be free to induct forces which were previously outside of the field army. First of all, the locally bound members of the Territorial Service will automatically go over to the guerrilla warfare detachments in order, jointly, to continue to carry on the battle. Moreover, commanders may, at their discretion, enlist additional, capable forces for their formations.

In order to conform to the international legal principles of The Hague Convention, a combat formation need only be led by a regular commander. In addition, those participating in combat must be recogniz-

able as members of the Army by means of uniforms or other easily recognized distinguishing marks.

Representatives of the Law

As Swiss, we must unswervingly hold fast to the legal regulations, even when others disregard them or hold them in contempt. We can be representatives of international law and the Red Cross idea only when we ourselves remain on the side of law and humanitarianism. We may, without fear, apply the name of partisans to our guerrilla detachments. It is not a matter of nomenclature; the decisive factor remains that the guerrilla or partisan combat must be waged by detachments with a military command, not by uncontrollable civilian underground elements.

This respect for the rules of The Hague ground-warfare regulations is necessary in order not to give the enemy a claim for disregarding them. However, the civilian population, even in case of complete observance of The Hague Convention, will not be able to expect to be spared entirely from a brutal enemy. We must, however, avoid the danger of exposing the civilian population to reprisals as the result of irregular band activities.

Lessons From History

The value of a civilian underground is greatly overestimated. During World War II, this type of fighting remained for a long time virtually without effect. The French Resistance, which is so often commended to us, did not become a decisive factor until it had received enormous assistance from the British and the Americans, and the time of the invasion was drawing near. Partisan fighting without the co-ordination of a friendly army or strong allies is doomed to failure, because the individual actions are of no effect and the detachments are wiped out individually.

Experience proves that there is chance for success in guerrilla warfare only when it is waged by energetically handled and wisely led detachments of army personnel. It is maintained that success in partisan or guerrilla operations depends on detailed prior planning and on tactical preparation, but this concept is unsound. In Switzerland, where there is a dense population and a wealth of communications, no guerrilla warfare could be planned far in advance. It would require, on the contrary, the most extensive improvisation and action on the spur of the moment. Many of our officers and subordinate officers, because of their outstanding knowledge of our terrain and familiarity with our population, are destined for the command of daring guerrilla detachments. Our soldiers also, particularly those from rural and mountainous districts, are excellently suited for the fatiguing and dangerous fighting of guerrilla warfare. Detachments which are composed of such officers and men will also, without a concrete mission, take advantage of the favorable situation of the moment to hurl themselves on the enemy. To them it suffices to know that the enemy is on Swiss soil to spur them on to their best and hardest efforts.

Prior Preparation Questionable

It is often demanded that partisan warfare be prepared beforehand by the systematic establishment of depots and ambuscades. The suitability of such measures is highly questionable. To be sure, many things are prepared, even with reference to the final phase of our defense fighting, but it would be an inexcusable mistake to make public anything about these preparations or still further reaching measures. In our communicative population, no preparations for guerrilla warfare could be kept secret. The slogan "He who cannot refrain from talking does harm to the Fatherland" was not even effective during the period of active service. Who

could possibly maintain that this slogan would be more effective in time of peace? Yet, the effectiveness and success of guerrilla warfare depend on the possibility of surprise and traceless disappearance. This possibility exists only when all preparations are known but to a few individuals.

Under our Swiss conditions, there is no possibility for long-range preparations for a partisan army or guerrilla warfare. It must be the first aim of the Army to meet the enemy with a well-calculated concentration of its forces, in order to inflict the greatest possible losses on the enemy. Our troops must go over to guerrilla action only when the first objective can no longer be realized. Even then, every Swiss commander must act with the determination to combat the enemy with all the energy at his disposal.

The Value of Resistance

A potential enemy must be made to realize that the Swiss Army will not be conquered with the disruption of its defense front; that in every valley, in every forest, and on all heights military detachments and patrols will continue to offer stiff resistance. A general staff that is aware of this fact will ask itself whether an attack on Switzerland would not absorb too many forces and require too much time. Therein lies the terrifying effect of our guerrilla warfare. An underground movement along any other lines would never constitute a military threat.

Demolitions and Minelaying—Some German Methods

Digested by the MILITARY REVIEW from an article by Major M. L. Crosthwait in "The Royal Engineers Journal" (Great Britain) June 1952.

MUCH time and thought has been given lately to demolitions in the withdrawal, and minelaying. As these subjects are being so much discussed, the time is opportune to suggest any lines of thought which might help those whose task it is to produce our own policies on the subject. This article discusses some German methods used during the last war. These methods might possibly provide ideas worth developing. The demolitions aspect will be considered first.

Road Denial

During a withdrawal there are two main ways by which, through creating obstacles, an advancing enemy can be delayed. There is first of all the stop line, the river or whatever it may be, when by destroying all the bridges the enemy is forced to deploy and to stage a large-scale bridging operation. This aspect, with its careful arrangements for preparing the bridges for demolition, the arrangements for giving the order to blow, and the provision of infantry bridge garrisons, receives a lot of attention both during paper schemes and schemes with troops. The other aspect, how best can an endless series of obstacles be created so that the area between one stop line and another is effectively blocked, receives considerably less attention if any at all.

The latter problem is not an easy one. In short, it can be called "road denial." It is a problem which the Germans became past masters at solving.

A Little Verge Mining

As for our own methods, the *Infantry Division in Battle, 1950*, acknowledges the fact that during a withdrawal mines

should be placed along the verges of the road or at bottlenecks, "utilizing a small party of engineers with the necessary mines and equipment," and that "the rear guard mobile troops should contain an engineer element for subsidiary demolitions and mining." It would seem, however, that something more than a "small party of engineers with the necessary mines and equipment" is required, if anything more than a little verge mining is to be produced.

After all, the main aim is to secure a respite before the enemy catches up again. The contrast between enemy transport flowing along the axis roads unimpeded and the same transport, reduced to the pace of an engineer walking on ahead with a mine detector, and lagging many miles behind the enemy spearheads, needs no emphasis. And lag it will if the engineers are given a real chance to tear the road system to pieces as the withdrawal proceeds.

The German Effect

No one who had first-hand experience of following up a German retreat can forget the thoroughness of the German methods. Every road and side track was blocked. Even the most insignificant cart track was likely to have had a booby-trapped tree felled across it. Culverts, craters, mines, trees, booby traps, or some other type of obstacle was to be expected. Finally to arrive at a major obstacle—the 250-foot span broken bridge or whatever it was—was almost a relief. At least everyone knew what he was up against. There was nothing more disheartening to a conscientious engineer squadron commander than to have a vehicle blown up and a life lost in some obscure place, which his engineers had already checked to the best of their time and ability. How was all this organized?

The Source of Information

It is difficult, 7 years after the war, to get hold of German training manuals. German practice can often be found out only by asking a member of the former German Army, if one with the necessary knowledge can be found. The information on which this article is based was given to the author by a former captain in the German Engineers (*Pioniere*).

This man was a member of a divisional engineer battalion (*Pionierbataillon*) for most of the war. Some of his experience was with Rommel's armored division in France, most of it was with a German infantry division in Russia.

The *Pionierbataillon* was organized very similarly to our divisional engineers. It consisted of 3 companies (each approximately 210 men), each company being made up of 3 troops, each of 48 working members. Each troop had 4 sections (*Gruppen*), each consisting of a noncommissioned officer and 12 men. Each company was affiliated to one of the infantry regiments (brigades). There was also a field park element, including bridging train, in the battalion. The tasks of the divisional engineers were similar to those found in British practice.

From the Top Down

One can well imagine, from seeing the effect of German withdrawal demolitions, that their execution did not depend, as with us, almost entirely on engineer initiative. The business of creating as much delay as possible was planned from the top, and given as much priority and thought as the creation of the next defensive line. The general staff was well aware that the engineers could not produce obstacles across the entire front—laterally and axially—without being given time and resources, and the requirements and convenience of other arms were often sacrificed so that this could be done. It was done in two main ways:

1. It was an accepted fact that the bulk of the divisional engineers would be re-

quired initially for this "scattered" demolition work. This would always take priority over the preparation of the next defensive line, and, if it were at all possible, over the preparation of major stop lines. This generally meant that stop lines were prepared for demolition by army troops and then handed over to divisional firing parties.

2. Once the timetable of the withdrawal was settled, the general staff would make a wide distribution of a map showing which roads would be closed to *all* traffic and the times. This would either be done by showing the roads along which the rear guard would withdraw in, say, red; roads that would be open until H minus 8, say, in blue; H minus 16, in green; and so on, or entire areas would be colored in, areas marked in certain colors being only passable up to certain times.

On receipt of these maps, a unit which was located in an area which was to be closed at a certain time would have to move before that time. If it did not, it merely got mined in. Special provision was generally made for gun areas, but all other units had to change their locations in accordance with the map. About this there was no argument, and everyone accepted that fact. The engineers, therefore, had time progressively to create obstacles over the entire front until they were only left with the final withdrawal routes.

Thus, the operation was properly phased, the engineers had proper time to carry out their work and by the time the rearmost troops began to move back, only a minimum number of engineers was required in the forward areas, as there was only the minimum of last-minute demolitions left to do. The remainder by this time would have moved back to join in preparing the next defensive positions, or would have taken over the next stop line.

Control During the Final Phase

As the rear guard began to move back, a typical picture would be as follows. It is assumed that one regiment is conducting the withdrawal and is coming back on two routes. The two routes would still be open, but all demolitions on them would have been prepared. These would include:

1. Mines would be laid and camouflaged in the verges and in the road. All that remained to be done would be to withdraw the safety pins. (*Note.*—This referred to *Teller* mines only. A *Teller* mine which had not had the safety pin removed would take the weight of the heaviest vehicle. It was, therefore, safe to bury them in the road. This procedure was not possible with some of the later German mines.)

2. Craters and trees would be prepared ready for firing.

3. Farm carts or other equipment would be ready for pulling across the road, with the booby trap in place, ready to be connected to the trip wire.

4. Side turnings would be blocked and mined.

5. Craters, mines, and blocks would be laid in groups, one group perhaps stretching 80 to 100 yards. Normally, two men (engineers) would be left to look after each group. Thus, there might be 8 to 10 groups (16 to 20 men) strung out along the road. No reliefs were provided for the sentries and these men might be on duty a considerable time. They fed themselves as best they could.

6. Each troop would cover a maximum of 15 to 20 miles of road. This would naturally mean that the groups of demolitions would be far apart. If the withdrawal was less than 20 miles then the groups would be closer together.

7. The first group would include the engineer officer in charge of the demolitions on that particular road. He would have a radio set on the rear guard commander's net. He also would have written firing orders. These would state on whose orders the demolitions were to be fired or the mines armed (normally, the commander of the rear guard). The firing

orders would include a space for the signature of the rear guard commander or the officer who was acting in his behalf.

Firing the Demolitions

As the rear guard passed the first group, the rear guard commander would give orders (in writing) for the demolitions to be carried out and the engineer officer would then give the orders to blow, arm the mines, or complete other work that was required. The engineer party, after completing their task, would then come on back with the rear guard. They would have their own vehicle, often a tracked armored troop carrier, which contained a radio.

As they went back they would pick up the engineers who had been guarding subsequent groups, and the entire party as required would arm mines, set off demolitions, or complete other work that was beyond the capacity of the original sentries. The engineer officer would get his "order to blow" confirmed in writing for each group of demolitions. The time of demolition was always noted.

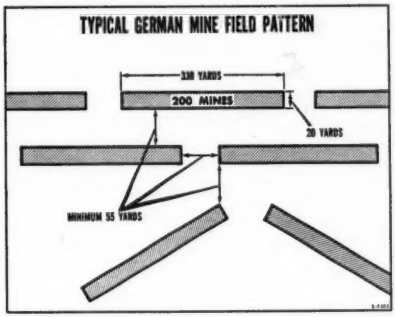
Thus, the routes along which the German rear guard had withdrawn would be effectively blocked, and mined, and any side roads or tracks between these routes would also be similarly blocked and mined.

Familiarity and Discipline

This procedure, as related by this former German officer, seemed to be very simple and invariably effective. The officer, when questioned more closely as to whether things really went quite so smoothly, seemed surprised that anyone could possibly see any snags in it. The German fundamental advantages seemed to have been as follows:

1. Because the engineer side of "demolitions in the withdrawal" received so much attention from the top, familiarity with the methods and procedures spread downward throughout the division. *Everyone* knew, whatever his arm, exactly how they were carried out, the method of giving the orders to blow, the respective responsibilities of the engineers and the rear guard, and so on. It was just as much a part of the divisional battle procedure as deployment or movement by road.

2. Apart from this familiarity and because it was so important, everyone took great pains to prevent anything going wrong. There was normally no question of



a noncommissioned officer at an isolated group getting panicky and setting off his demolitions too soon, or of the officer in charge not making sure he was getting his orders correctly. Apart from the fact that he was as familiar with the composition and command of the rear guard as the rear guard was familiar with his problems, it was literally as much as his life was worth to allow things to go off too soon. To let a "withdrawal demolition" go wrong because of carelessness or inefficiency could lead to a very quick and early grave.

The Penalty of Disobedience

The following story illustrates this latter point. During the Russian retreat, the procedure described above was being carried out down a brigade withdrawal route. At one point, a small bridge was prepared for demolition. Alongside the bridge was a ford, the approaches to which had been mined. There was a noncommissioned officer and two men in charge of this "group."

The noncommissioned officer thought he would save time by arming the mines on the track leading to the ford, leaving only the bridge to be blown when the rear guard passed. The noncommissioned officer was unfortunate, in that the brigade commander himself came along at that moment and noticed what was happening. The noncommissioned officer, on admitting that he had had no orders to arm the mines, was immediately found guilty and summarily shot by the brigade commander's liaison officer.

Things have less chance of going wrong if the wages of disobedience is death.

Miscellaneous Points

The procedure for the close bridge garrison and the division of responsibility between its commander and the commander of the engineer firing party were almost exactly the same as present British practice. It is interesting to note, however, that the Germans had no equivalent of "Army Form 4012 B" (a checklist for the blowing of bridges). Each German engineer officer in his *Recce Pocket Book* had a list of points to which he should know the answers before setting out on a demolition task—the type of points that one finds on the "4012 B"—but otherwise each bridge or similar item was treated on its merits and special orders were issued for it. There was no set *pro forma*.

The mysteries of Readiness "A" and "B"—detonators connected, but not pushed home—had clearly caused the Germans as much trouble as it does us—especially making the staff and units fully conscious of the time it takes to change from one to the other and how it varies for different types of bridges.

The German engineers seemed to have evolved no better system than we have for getting at the underneath of the roadway. Stagings and ladders had to be improvised from scratch for each bridge. No special made-up gadgets were carried except for rope ladders.

German textbook practice was to make a diagonal cut in the roadway in the same way as a diagonal cut was made in the main girders. This roadway cut being designed to slope from the upstream side to nearer the abutment on the downstream side. Normally one complete diagonal cut would be made at one-third span from the home abutment and the *enemy* abutment would be cratered.

The idea of the diagonal roadway cut was to tilt the bridge. This did not generally work out in practice owing to the difficulty of fitting a diagonal staging under the bridge, so that the one-third span cut was carried out exactly as we would, with a straight cut across the road.

Minelaying

The normal German methods of minelaying are worth describing, although they may be familiar to many readers. They differed from British practice in one fundamental point—basically the procedures depended on each man carrying, laying, burying, and arming four mines. There was no system of separate carriers, layers, armers, and buriers.

Panels

German mine fields were, if possible, laid in panels, each panel being 220 to 330 yards long and consisting of four rows, with about 6½ yards between mines and rows (200 mines). The 330-yard panels would be laid out in variations of the pattern shown on page 79. As many panels were laid as were necessary to cover the front laterally and in depth. Panels would not be closer to each other than about 55 yards, chiefly to minimize the danger of walking into a completed panel when laying additional panels. Panels were, of course, sometimes laid shorter than 330 yards, especially if working parties were small.

Method of Laying

The basic laying party for one panel

was a troop (50 men) with one vehicle (200 mines). The vehicle (or sled in Russia) was maneuvered as near to the location of the panel as possible. Each man then carried four mines up to the site. Two *Teller* mines could easily be carried by their handles in each hand. A short spade was also carried by each man slung from his waist, like our entrenching tool. The rifle would be slung on the back.

On arrival at the site two laying methods were used:

1. *Most favored method.*—One tape would be laid to show the alignment of the first (home) row only. Lights, which had to be lined up like leading marks, were also sometimes used. The 50 men were then lined up at about 6-yard intervals along the tape. On a given signal (flashlight, whistle, or word of command) each man laid one mine at his feet. The entire line then walked forward six paces, turned left (or right), walked three paces, and then each man faced his front and laid another mine down at his feet. This process was repeated for the remaining two mines until each man had laid his four mines. At night, each mine had a circular piece of white tape laid on it so that it could easily be found again.

The entire line then went back to the first row and buried the mines, similarly treating the second, third, and fourth rows, the piece of tape still being used to mark where the mines were buried. When each man had buried his fourth mine, at a given signal the safety pins (these were on a string which would be led to the surface after burial) were withdrawn, followed by the safety pins of the third, second, and first rows. The mine field was then complete.

The party then marched to the position of the mine dump or vehicle for the next panel.

If antipersonnel mines were to be laid, these were laid by a separate party using a similar procedure. No one objected to walking over an armed *Teller* mine field, so the *Teller* mines were disregarded by the antipersonnel minelayers.

2. *Alternative method.*—In the most favored method, only one tape (or one row of light markers) was laid. In the alternate method, a tape (or lights) was laid for each row and a party of 12 men and a noncommissioned officer (that is, one *Gruppe*) would be assigned to each tape. The noncommissioned officer would then pace along the tape followed by his 12 men. Each man would then lay his four mines on the enemy side of the tape as directed by the noncommissioned officer. Each man then buried his four mines starting with number one. When all the mines were buried, the noncommissioned officer walked back along the tape, reeling it in as he went, and as he came to each man the man would arm his four mines and then walk back along the tape in front of the noncommissioned officer.

This method obviously took much longer than the first, but it gave better control in close country.

Timings

Under favorable circumstances with the first method, a panel 330 by 20 yards could be laid in three-quarters of an hour by night. If the country was very difficult then it might take up to an hour and a half. The second method (which was only used when the conditions for control were bad) might take from 1½ to 2 hours for each panel. If the second method for some reason was used in favorable country, a panel might take an hour or so to lay.

These timings are based on a working party of 50 men. If the size of the party were smaller, the same time would be taken, but the over-all length of the panel would be proportionately reduced.

Such times do not include the carry from the mine dump. This might be only a few minutes, but one mine field, which this German engineer officer remembered

laying, entailed a carry of more than a mile.

Reconnaissance and Recording

The recce party either taped out the outline of the complete 330 by 20 yard panel, or taped the home row only, or taped all four rows according to which laying method was to be used. Recording was done by "tying in"—by bearing and pacing—the two home side corners of the panel to some fixed point or landmark. A record was then made of the numbers and types of mines in the panel. The record included a statement as to how the mines had been laid. In both methods, the 200 mines could be laid using any type of pattern, all depending on the numbers of paces the men were told to take.

These two methods stood the test of being used to lay millions of mines in Russia. They were, so the German engineer officer said, extremely easy and reliable, and the recording and supply of mines were very simple. Even with other types of mines, such as the *Holz* mines which had no handles, it was still possible for a man to tuck two mines under each arm. When asked if they had not found a system of carriers, armers, and buriers even easier, he expressed surprise at the—to him—clumsiness of such a system.

There were other methods—knotted tapes, and so on, so that the pattern could be accurately varied—but these were not much used.

Conclusion

The foregoing remarks are made for what they are worth. They certainly give food for thought. One can only say that the results were effective.

The Future of Airborne Operations

Digested by the MILITARY REVIEW from an article by Captain J. A. MacMahon in "An Cosantoir" (Ireland) April 1952.

THE Soviets were the pioneers in the use of airborne troops. In 1936, they launched a regiment of 5,000 paratroopers into battle in their maneuvers at Kiev. For unstated reasons, they have never since attempted to employ airborne troops on such a scale, although countless opportunities must have presented themselves during their war with Germany. The Soviet Union, with its extensive rolling steppes and widely separated battle zones, should be ideal for paratroops and gliders, yet only on two occasions, once at Vyasma in 1942 and again at Kanev in 1943, did they launch any airborne forces into battle. Those were only small operations and proved abortive.

It might be that the Soviets refrained from using airborne troops because, first, they failed to achieve and maintain air superiority; second, powerful German armor could be quickly concentrated against them; third, as the weather was very cold it would have prevented the dropping of paratroopers especially in winter when the Soviets carried out their major offensives; and, finally, the Soviets must have realized that the amount of effort necessary to mount an attack by an airborne division would pay greater dividends if diverted to other channels, for example, the equipping of one armored division.

German Efforts

The Germans were quick to realize the potency of this method of warfare, now known as vertical envelopment, and in a

series of attacks they showed that not only had they appreciated its value but also that they had mastered its technique. In Norway, they launched their first major airborne attack, and in a short while they were masters of that country. Here, however, they were aided by a strong fifth column and opposed by a small and poorly equipped army. Their airborne forces played a major role in the battle for Norway.

The Low Countries, with their many water barriers, were considered to be a natural bastion for defense which could not be readily overcome, yet, inside a period of 30 hours, one of their strongest fortresses, Fort Eben Emael, fell to an assault by airborne troops supported by ground forces. The British and French plans for the defense of the Low Countries were nullified. The allies were amazed at the efficiency of the new arm. It had achieved the impossible. Small parties of paratroops dropped behind allied lines and created disorder and confusion. Rumor was rife and the numbers of paratroopers dropped were magnified. The Germans achieved results beyond their wildest dreams. The British retreated to England to lick their wounds and prepare for the next battle—the Battle of Britain—about which Major General A. J. H. Cassels, head of the airborne forces in that country, wrote: "You will remember how in 1940 our very meager resources were spread all over the United Kingdom to protect vital areas against German parachute attack, and this at a time when we could ill afford such dispersion. Therefore, it seems clear that the possession of airborne forces is, in itself, a contribution toward weakening the enemy even without actually using them."

The Germans did not attack England, and turned instead to the Balkans where they used their airborne forces in classical style to capture the bridge across the Corinth Canal at Corinth, thereby depriving the British and Greeks of its use as a means of retreating across an almost insurmountable water obstacle and providing the German ground forces with an easy means of crossing.

The Battle of Crete

From Greece the Germans turned to Crete, and as the world read of its capture by German airborne troops the military experts gasped in astonishment. Crete, an island in the Mediterranean Sea, over which England's Navy held sway, was conquered by a nation possessing no naval forces in the area. Crete was strongly held by 27,500 British Commonwealth troops, aided by 14,000 Greeks. It was captured by 25,000 German airborne troops who suffered 3,000 killed and 6,000 wounded; 170 out of 530 transport planes were lost.

The attack on Crete heralded a new era, and, as the Battle of Crecy and Poitiers mark the introduction of the supremacy of the archer over the knight, so will the Battle of Crete mark the advent of the airborne soldier. In future histories when the attacks on Sicily, Iwo Jima, and Guam are forgotten, the attack on Crete will still mark a red-letter day.

The German survivors of Crete rested on their hard-won laurels, and we hear no more of them until the allied assault on Sicily took place when the German 1st Airborne Division was dropped in rear of the battlefield to reinforce the hard-pressed German ground troops.

On 12 November 1943, a German airborne battalion, though outnumbered 10 to 1, played a vital part in the capture of the island of Leros in the Dodecanese. Here they were supported by an amphibious assault.

In the Ardennes offensive in 1944, the Germans used paratroopers to spread confusion behind the American lines.

The Allies Organize

The British were greatly impressed by

the performance of the German airborne troops, and in 1940, in response to a request from Mr. Churchill, who even in World War I advocated the use of paratroopers, they established a force of 5,000 parachutists. From this force they later organized the 1st and 6th British Airborne Divisions together with a number of other smaller units.

The Americans were quickly off their mark and by 1945 they had unleashed upon their enemies the 11th, 17th, 82d, and 101st Airborne Divisions together with a number of smaller parachute combat teams. Those American divisions were refinements and improvements on any airborne troops yet launched into battle.

The British airborne forces carried out a number of raids in 1941 and 1942, the raids on Bruneval and Monte Vulture being classical examples. The effect of these raids was tremendous. After the Monte Vulture raid, the Italians took detailed precautions to guard vulnerable areas in Italy.

The North Africa Operation

The British supported the allied assault in North Africa by dropping the 1st Parachute Brigade to seize important features in front of their armies. Nothing very spectacular was achieved. In this operation, heavy casualties were suffered by the paratroopers in landing, as a result of hitherto unexperienced atmospheric conditions and also as a result of enemy action. One battalion of this brigade lost 16 officers and 250 other ranks.

It was in the assault on Sicily that the Americans entered the airborne warfare, where they lost very heavily because of bad planning and the fact that they dropped their paratroopers in a 25-mile-an-hour gale. Their troops were badly scattered on landing, and in an effort to dodge enemy radar stations they flew over their own fleet and many of them were shot down by their own antiaircraft fire.

The British fared about the same, losing 25 to 30 percent of their airborne troops; of 100 gliders, 50 fell into the sea and 25 were never heard of again.

Yet, when General Kurt Student, the German expert on airborne operations, was questioned after the war on the effect the allied airborne troops had on the Sicilian campaign, he stated: "The allied airborne operation in Sicily was decisive despite widely scattered drops which must be expected in a night landing. It is my opinion that if it had not been for the allied airborne forces blocking the Hermann Göring Armored Division from reaching the beachhead, that division would have driven the initial sea-borne forces back into the sea. I attribute the entire success of the allied Sicilian operation to the delaying of the German reserves until support forces had been landed by sea to resist the counterattack by our defending forces (the strength of which had been held in mobile reserve)."

In the attack on Italy, the Americans dropped their airborne troops inside the beachhead as reinforcements when the landing was seriously threatened by German counterattacks.

The Attack on Europe

The north coast of France, the area chosen for the D-day assault, was strongly held by the Germans. Special precautions were taken to guard the rear of the coast against airborne troops. One of these precautions was the erecting of poles—about 6 to 12 inches in diameter and 8 to 12 feet in height—in likely areas for airborne troops. One division alone erected 300,000 of those stakes which were normally wired together. Rommel, in his instructions to German commanders, stated: "Erecting stakes alone does not make the obstacle complete, the stakes must be wired together and shells and mines attached to them. The density must be a thousand stakes per square kilometer. It will still be possible

for tethered cattle to pasture underneath these mined obstacles."

This was the welcome prepared by the Germans for the two American and one British divisions which landed by air before dawn on D-day.

The British 6th Airborne Division had a successful operation, its capture of the Merville coast defense battery and the Benouville Bridge being classical examples of the employment of airborne troops, equal in planning and execution to any of the German operations. A battalion of 600 dropped to capture the Merville battery numbered 80 at the close of the action. The glider landings of this division were 88 percent successful; at the end of D plus 2, the division had suffered 800 casualties and more than 1,000 paratroopers had failed to reach their rendezvous.

The American 101st Airborne Division was widely scattered in its drop, partly because of the fact that the pilots of the transport planes took evasive action when they came under antiaircraft fire. The division captured its objective at a cost of 1,500 casualties and 60 percent of its equipment.

The American 82d Airborne Division fared badly too. It captured its objective, and on D plus 33 its infantry casualties amounted to 57 percent.

Not alone did the American airborne divisions suffer heavily but also their supporting air forces suffered very badly in their resupply mission.

Major General Gavin, commander of the 82d Airborne Division, wrote in an American military publication in 1948: "None of us who saw the resupply flights coming into the 82d Airborne Division will ever forget the amount of flak and small-arms fire that troop carrier formations had to take. It was 'Murder on the Mederet' as some of the troopers described it at the time. Yet that dangerous and difficult resupply was vital to the continued combat existence of the airborne units on the ground. Jeeps and antitank guns and light field artillery were landed with the D-day divisions."

Operation 'Market-Garden'

Operation *Market-Garden* next saw the First Allied Airborne Army in action. It was a daylight operation.

The American 101st and 82d Airborne Divisions landed successfully and captured their objectives. The operation was supported by a fleet of 1,113 bombers and 1,240 fighters which were expected to wipe out enemy opposition, especially enemy antiaircraft positions.

The 82d Airborne Division had 750 casualties out of the 7,477 troops employed, approximately 10 percent.

The 101st Airborne Division fared similarly. In this operation, the American success was due to their use of the number of waterways as antitank obstacles.

Deeper in German-held territory at Arnhem the British 1st Airborne Division was faring badly and was finally forced to withdraw, having suffered 7,605 casualties out of the force of 10,095 that dropped. The operation of this division was more or less a failure not attributed to any fault of its own—in a ground combat role it fought as no other British division had fought; outnumbered and surrounded, it held on until ordered to withdraw.

Its failure was due to a number of reasons, the principal one being the failure of the Second Army to reach it on the overland route. It landed right in the middle of a German armored division; it was dropped too far away from its objectives; its supply-dropping zones were held by the Germans and most of its supplies fell into German hands; and antiaircraft fire in the area was intense. The Royal Air Force flying in support of the Arnhem landings suffered crippling losses.

The entire operation, however, achieved good results and the British Second Army

in a short while advanced many miles into German-held territory, an advance which might have proved equally costly had they tried to fight their way forward.

The Rhine Crossing

Profiting by the lessons learned in Operation *Market-Garden*, the allied leaders planned their next airborne operation in more detail and with greater acumen. Their operation for the crossing of the Rhine marks the apotheosis of all airborne achievements. Here the British 6th Airborne Division and the American 17th Airborne Division were dropped on the far bank of the Rhine within artillery range of the ground troops already assaulting across the Rhine. The preliminary softening-up of the area consisted of intense artillery preparation; bombers dropped 2,700 tons of bombs on enemy airfields, 800 tons on antiaircraft positions; and on the day of the landing the supporting air forces flew 7,700 sorties. Only 88 out of the 416 gliders used by the British 6th Airborne Division landed undamaged. The division which left England at dawn that morning 8,000 strong had suffered more than 1,000 casualties by sundown.

The American losses were heavy also. One observer saw 23 of the division transport planes burning in the air at the same time. The entire operation was successful! All objectives were captured. The road lay open to the heart of Germany.

This ended the allied airborne operations in Europe.

The Attack on Corregidor

In the Far East, the Americans attacked Corregidor with the 11th Airborne Division. Corregidor, a small and rocky island defended by 6,000 Japanese, was considered entirely unsuitable for an airborne landing. Consequently, the Japanese did not take any antiparatroop precautions. The capture of the island cost the 11th Airborne Division 10.7 percent casualties.

Features of Airborne Operations

The two features of this review which must strike the reader rather forcibly are, first, that airborne troops almost invariably captured their objective, and, second, that all the operations, no matter how well planned or carefully executed, exacted a large toll from the airborne troops.

What About the Future?

And now, what of their future? The appalling losses suffered by the airborne troops in World War II must forever be borne in mind by commanders in chief. Experts in airborne warfare can visualize no future war without the mass employment of airborne troops.

Major General Gavin states in *Airborne Warfare:* "The future of our armed forces is in the air. All fighting men and everything they need to fight with in the future and live on as they fight must be capable of movement by air. Only through flight can we wage a future war in accordance with the principles of surprise, mass, and economy of means. Only by exploiting to its utmost the great potential of flight can we combine complete dispersion in the defense, with the facility of rapidly massing for counterattack which today's and tomorrow's army must possess. Even without the power and use of atomic energy for war, these things would be true. With the use of atomic energy, they become axiomatic."

In a 1948 issue of an American military publication, General Gavin stated: "The place for the heavy tanks is in the Smithsonian Institution. The future of armored vehicles lies in lighter, much lighter, equipment. These lightly armored vehicles must mount the most highly penetrative guns available for reasonable ranges, say, 2,000 to 3,000 yards. They must have great cross-country mobility. They must have enough armor to protect the crew from flak, small-arms fire, and air bursts."

This expert seems to be carried away by

the importance of the vertical envelopment and sees very little future for ground combat forces. Armor experts do not agree with his theory on tanks.

Limitations

Major General Cassels is more conservative in his opinion. In a 1949 issue of a British military publication, he stated: "There are, I think, a number of people who still question the value of having airborne forces and condemn them as an expensive luxury. I hope I have shown you that they have their limitations like anybody else; they can on certain occasions achieve things which could really be done by nobody else and on other occasions they can be a considerable help and timesaver in a land battle and may save innumerable casualties. However, you will say I am biased. In answer, I can only say that immediately after the war the Chief of the Imperial General Staff—Field Marshal Lord Alanbrooke—asked some of the senior theater commanders who had had experience of airborne forces for their opinion on this very point. I am glad to say that the opinion was unanimous that no army should be considered modern or complete without an airborne forces' element."

General George S. Patton stated about the airborne division of World War II: "The current airborne division does not possess adequate heavy weapons to sustain itself in battle except for very short periods. Airborne divisions committed to ground operations during World War II had to be reinforced with equipment at the expense of other divisions and corps. Any unit based on improvisation is not so good."

Manpower and Production Required

Only nations with great industries and huge reserves of manpower will be able to maintain airborne divisions. The cost of maintaining and training them will be enormous when one considers that it takes 700 transport planes and 300 gliders to move a division. Nobody has yet calculated the cost of launching an airborne unit into battle taking into account the cost of training and equipping and the cost of supplying them. Would the commander of the British Second Army have achieved greater results if he had been given three extra heavily armored divisions for Operation *Market-Garden*? Nobody can answer that question. But it gives food for thought and maybe a subject for discussion for many years.

Future Employment

Powerful nations will maintain airborne forces, and judging by their uses in the recent war, they will be employed as follows:

1. As *coup de main* parties, to seize important objectives and to carry out raids and sabotage.
2. To land in rear of invasion beaches and prevent the movement of enemy reserves intended to counter the landing.
3. To land within a defended perimeter to reinforce threatened sectors of it.
4. To support river crossings (as in the Rhine crossing).
5. To effect a deep penetration in hostile territory.
6. To capture enemy strong points.
7. To capture islands of strategic importance.
8. To create disorder and confusion in rear of the enemy.
9. To counter guerrilla operations.
10. To occupy countries whose defense is poorly organized.
11. To support *coup d'etats* in other nations.
12. By their very existence to induce commanders of opposing forces to keep their armies dispersed covering many vulnerable points of their territories.

The Turkish Army

Digested by the MILITARY REVIEW from an article in the "Australian Army Journal" March 1952.

PRIOR to 1914, the symptoms of decay in the Ottoman Empire were already defined, and her participation in World War I on Germany's side completed the dissolution of her empire. By 1919, she was shorn of her dependencies; her territory was occupied by allied forces; and the corrupt and ineffective authority of the Sultanate lay submissive under allied authority.

Between Two World Wars

In May 1919, Mustafa Kemal—the outstanding Turkish general of the war—proscribed by the British and renounced by the Ottoman Government—landed at Samsun, supposedly to deal with the resistance movements in Anatolia. Kemal, a born soldier, ruthless and intensely patriotic, was, however, resolved to liberate his country. He set up an insurgent government at Ankara. He consolidated his position in 1922 by deposing the Sultan, and in 1923 by a proclamation declaring Turkey a republic with himself as President; and, finally, by the abolition of the caliphate in March 1924.

While these events were taking place, the Greeks, with the support of the allies, were conducting military operations against Turkey. Kemal reorganized the Army and welded it into an effective force. He trained it by sheer force of character and energy, and so inspired it that the war against the Greeks for Turkey's independence was brought to a successful conclusion by the Mudania Convention in October 1922. With the exception of the Turkish Brigade now fighting in Korea, this was the last occasion on which the Turkish Army was engaged in war.

Thus, after the final defeat of the Greek forces and the withdrawal of the allies, Kemal, now styling himself Ataturk (Father of the Turks), stood out in the eyes of his people as a military dictator of the first order who was capable of upholding the claim of Turkey against Western aggression.

With the disappearance of the Greek danger, the Turkish Army was gradually demobilized, and by mid-1922 the Turkish forces consisted of 28 infantry divisions and 7 cavalry divisions, representing a force of some 300,000 men.

World War II and After

At the outbreak of World War II, the Turkish Army was still on much the same basis as in 1922. The equipment was old and mostly of German origin, the transport was still horsed. With the entry of Italy into the war, Turkey decided to remain neutral, and, in order to maintain her neutrality, mobilized her forces.

Under the Anglo-Turkish Treaty of Alliance in 1939, Turkey aligned herself with the allies and thereby received such warlike stores and equipment as could be spared by both Britain and France.

Despite German attempts to lure her into the Axis camp, she remained neutral until 1945, when, after much diplomatic pressure, she declared war on the Axis, but her forces never went into action.

At the end of 1945, the strength of the Turkish Army was approximately 600,000, all ranks. Since that time, it has been gradually reduced to its present figure of approximately 300,000, organized into 16 infantry divisions, 3 cavalry divisions, and 6 armored combat commands.

Anglo-American Assistance

The Turkish General Staff, realizing the shortcomings of the Army, entered into agreements with Great Britain and the United States in 1947 and 1948, re-

The military qualities of the Turks have served as an excellent foundation for the reorganization and modernization of their Army. Above, Army troops participating in spring maneuvers. Below left, a machine-gun crew in action during a field problem. Below right, cadets participating in physical training drill.—Turkish Information Office photos.

spectively. Under these agreements, Turkish instructors were trained in the handling of the British and American equipment that had been supplied. In addition, the reorganization of the armed forces began.

Despite the fact that the reorganization of the Army into a more mobile force is progressing, some of the major formations still rely on horse transport.

The infantry divisions, which form the bulk of the Turkish Army, include three infantry regiments, one artillery regiment, one antitank battalion, one antiaircraft battalion, and various service units.

In addition, there are a number of newly formed armored brigades.

Command Organization

Prior to the amalgamation and reorganization in 1949 of the Ministry of National Defense and the General Staff, the Chief of the General Staff, who was virtually commander in chief of the armed forces, owed allegiance only to the Prime Minister. Under the reorganized system, the General Staff is now responsible to the Ministry of National Defense.

Recruiting and Service

Following the receipt of United States military aid and subsequent improvement of communications, which allow for quicker mobilization and transport of troops, the Turkish Government was able to reduce the size of its standing Army.

The period of military service, which all males between the ages of 20 and 46 years are required to render, was reduced from 3 to 2 years. The recruits are normally called up yearly, and after the completion of their service are transferred to the reserve.

While on the reserve they may be called out for training maneuvers, or to maintain order.

Under certain circumstances, service may be deferred, for example:

1. For the completion of a course of study until reaching the age of 29 years, or, in the case of certain professions, until 30 years of age.

2. For compassionate reasons.

Even though there have been increases in pay, the conscript's pay is so small that it is necessary for his family to supplement it during his period of service.

The Army Role

The main function of the Turkish Army is to defend Turkey against external aggression, and to assist, when necessary, in the maintenance of internal order. In addition, Turkey now has further commitments under the United Nations Charter, the North Atlantic Treaty Organization, and in the proposed Middle East Command.

The Turkish soldier is famed for his endurance and asks for little comfort. He also has great courage. His reputation as a defensive fighter is renowned from World War I, and already in Korea he has demonstrated that he can attack with great vigor and dash. A stable trait in the national character is an intense loyalty to superior authority backed by an instinct of complete obedience. On the other hand, this latter characteristic might tend to impair initiative in the junior ranks.

Conclusion

Turkey is intensely proud of her Army, and the gallantry displayed by the Turkish Brigade in Korea has fully justified such pride. In addition, the efficiency of this formation has shown that the Turkish soldier is capable of mastering the technical requirements of modern warfare. The military qualities of the Turks have served as an excellent foundation for the reorganization and modernization of their Army, and the progress thus far achieved makes it clear that the Turkish Army is capable of giving a very good account of itself should the occasion to do so ever arise.

Arms and Fighting

Digested by the MILITARY REVIEW from an article by
Lieutenant Colonel D. A. G. Waldock in the "Canadian Army Journal" February 1952.

"Fighting has determined everything appertaining to arms and equipment, and these in turn modify the mode of fighting; there is, therefore, a reciprocity of action between the two."

THE foregoing quotation was written by Karl von Clausewitz in his treatise *On War* just after the close of the Napoleonic era more than a hundred years ago. This work, an unfinished philosophy of war, was published after Clausewitz's death in 1831 and, in succeeding years, it greatly influenced not only German military doctrine, but that of most other nations as well.

In the past, the arrow and the sword had led to the employment of personal armor and the building of castles. The discovery of gunpowder and the invention of cannon and firearms defeated the castle and personal armor and displaced the arrow and the sword. The introduction of mobile artillery, used extensively by Napoleon, made possible the effective concentration of artillery fire which, together with the development of improved small arms, gave rise to many of our modern tactical concepts.

It was in the light of such past events that Clausewitz had reached his conclusion on the relationship between fighting and arms. It is proposed to study his findings in the light of events since 1914 and then attempt to forecast how fighting and equipment may influence each other in the next quarter century.

1941 TO 1952

World War I

At the start of World War I, the two dominant weapons were the machine gun and the quick-firing field gun. The machine gun heavily favored the defense and, used in a defensive role in conjunction with barbed wire, it ruled the battlefield leading to a state of siege warfare. The resultant widespread use of trench systems and fieldworks largely reduced the effectiveness of artillery.

Artillery Support for Infantry

One of the major tactical problems of the infantry attack was that of covering the last few hundred yards in the face of enemy machine-gun fire. This problem was partially solved by the use of the artillery barrage which was employed to neutralize enemy fire while the infantry advanced as close as possible behind it. To obtain greater effect against a well-entrenched enemy, it became necessary to use artillery of heavier caliber. The widespread use of the high-explosive shell in place of shrapnel also was adopted.

Counterbombardment Systems

Against the effect of these bombardments often had to be set the price of loss of surprise. Nevertheless, the effectiveness was such that it became necessary to set up elaborate counterbombardment systems, employing sound ranging and flash spotting techniques, to locate the positions of enemy guns. In later years, the successful use of flash spotting was to lead to a requirement for flashless powder.

The Introduction of Poison Gas

Artillery having met with only partial success, a radically new weapon was required to break the stalemate of siege warfare. In April 1915, the Germans first used poison gas. They achieved some limited success, but the gases used were

neutralized relatively easily and the weapon became ineffective.

Tank Warfare

The problem was eventually solved by the introduction of the tank toward the end of 1916. The tank provided weapon mobility and protection at the same time and was to revolutionize field tactics. Tanks were used as mobile screens of armored batteries behind which infantry could advance against the strongest defensive systems of the day.

Before leaving World War I, it is of interest to note that the state of the siege warfare stalemate prevailing in the earlier years led to increased reliance on the naval blockade as a weapon and to the introduction of air attack on civil populations and industry. This form of attack was used on a vastly increased scale in World War II, and was to lead to a demand for elaborate and costly antiaircraft defense systems. The naval blockade gave impetus to the development and widespread use of the submarine, which, in turn, necessitated the adoption of the convoy system.

World War II

Between World Wars I and II, the two types of major equipment which advanced most were the airplane and the tank or armored fighting vehicle, resulting in the growth of large air forces and the mechanization of armies. At the beginning of World War II, these two had become dominant weapons and both were used successfully in conjunction as the core of the German offensives in Poland and Western Europe. As a result, fighting took on a much more mobile and fluid character.

Antiaircraft Weapons Required

Tactically, air bombardment was used in the role of long-range artillery. Strategically, it was used as a weapon of terror and mass destruction against civilian populations and industry. An urgent requirement arose for improved antiaircraft ground defenses which was met to some degree by the introduction of radar, improved fire-control instruments, and higher velocity semiautomatic guns having increased rates of fire.

Requirements for Antitank Defense

Armored divisions, built around tanks and vehicle-borne infantry supported by self-propelled guns, were used to punch holes in strong defensive systems, to encircle the enemy, and to disrupt his lines of communication. To meet this form of attack, defense in greater depth became necessary. A requirement arose for effective antitank weapons and a race began between gun and armor, which is still in progress today.

Land mines were used on a large scale as part of the integrated defense systems and proved to be effective weapons against personnel and vehicles of all types. Efficient mine detection and mine field clearance soon became major problems which even today are not satisfactorily solved.

The effective use of mortars on a large scale made it necessary to expand the counterbombardment organization to include countermortar activities; radar and sound ranging being used to locate enemy mortar positions.

Improved Communications Facilities

The increased mobility of warfare demanded improved field communications leading to the widespread use of radio. Multichannel and high-speed telephone communication systems were introduced to cope with the increased volume of traffic and to conserve cable. Improved communications in turn enabled the principle of concentration of artillery fire to be developed to a very high degree and in a flexible manner. The fire of complete divisions and even corps was able to be brought down on specified targets at relatively short notice. Improved communi-

cations also had a profound effect upon tank tactics.

Development of Airborne Warfare

Another revolutionary development in land warfare arising from the advances made in aviation was the introduction of airborne units. It became possible to drop entire divisions of specially equipped troops from the air behind enemy lines to secure strategic points and to harass the enemy rear. Thus was the mobility of warfare increased, still further emphasizing the necessity for increased defense in depth. Headquarters and supply units in the rear now had to be capable of adequately defending themselves against sudden attack either from the air or from highly mobile armored units.

The Amphibious Assault Weapon

Operations during the latter half of the war called for an increasing number of amphibious assaults both in the European and Pacific theaters. These, in turn, gave rise to requirements for special amphibious assault equipment among which might be mentioned the various types of landing craft and the amphibious jeep. Since landing craft were not always able to approach close enough to shallow beaches, it became necessary to waterproof vehicles of all types, and often the equipment contained in them, so that they might wade ashore. The success achieved in the development of amphibious equipment and the waterproofing of existing equipment, in turn, permitted amphibious operations to be undertaken on a more ambitious scale. This culminated in the Normandy assault, in which entire divisions complete with their equipment were successfully landed in the space of a few hours.

Climatic Problems Solved

Arising from the operational need to fight in tropical theaters, equipment had to be adapted to enable it to perform satisfactorily in dry and humid tropical climates. Such fighting had previously been seriously limited by the capabilities both of the soldier and his equipment, but successful campaigns such as those in Burma and the Pacific islands were made possible largely by the effective tropicalization of allied fighting equipment and improved tropical hygiene.

Major Equipment Developments

Toward the end of World War II, three major equipment developments made their appearance: the VT or proximity fuze, the guided missile, and the atom bomb. The former met the requirement for consistently obtaining air bursts at optimum height and appeared in time to materially influence the Battle of the Bulge and the closing stages of the Pacific campaign. The atom bomb succeeded in bringing the Pacific campaign to an abrupt and successful conclusion by completely destroying the will to fight of the Japanese Nation as a whole. The guided missile, as used in the forms of the *V-1* and *V-2*, was not particularly effective. The influence of these three developments on the future pattern of fighting will be discussed later.

Thus, it may be seen that Clausewitz's statement has been amply borne out by the experience of two recent world wars. Every weapon has been designed to meet certain operational requirements arising from the pattern of warfare obtaining at that time. No sooner is a new weapon in the hands of troops than the pattern of warfare changes, on the one hand to enhance the effect of the weapon and on the other to minimize it.

1952 TO 1975

The future is inclined to be somewhat obscured by the recent introduction of weapons of mass destruction, namely, the atomic, bacteriological, and chemical warfare weapons. Experience in the use and effect of these weapons to date is very limited indeed and points toward their

being most effective when used strategically against civilian populations rather than tactically against armies in the field. Rather than risk confusing the issue by discussing these weapons at the outset, it is proposed to consider first the future influence of fighting and equipment upon each other in the more orthodox fields.

Orthodox Warfare

The race between gun and armor may be expected to continue for some time with the tank becoming the main antitank weapon. Requirements may, therefore, arise for three major classes of tanks, one for use in the tank-destroyer role, one for use in the infantry-support role, and the other for use in the traditional cavalry role. Should it be found possible to combine an effective antitank and high-explosive performance in the same gun, the first two classes would be merged into one, as in the past. Suitably stabilized tanks will be able to fire on the move, relying on their movement for protection, thereby speeding up the attack. Heavy tanks are costly and give rise to numerous movement and maintenance problems in the field. It may be concluded, therefore, that they would become rapidly outmoded in the event that a more effective method of destroying them should be discovered. Here, an analogy may be drawn with the heavy battleship. Meanwhile, the armored division, possibly air transported as required, will continue as the main offensive component of an army.

Improving Fighting Efficiency

So long as the tank continues to dominate the battlefield, infantry troops will demand an effective weapon with which to combat it at relatively close ranges. Mortars will continue to be used with improved accuracy up to minimum artillery range and their effect may be greatly increased by the use of proximity-fuzed shells. The light machine gun and the automatic carbine may be expected to be combined in some degree with the rifle in the form of a fully automatic rifle so as to increase appreciably the fire power of the infantry section. Every effort will be made to reduce the load carried by the infantryman in order to increase his efficiency and endurance. Scientifically designed clothing, together with lighter and more efficient weapons, will all assist to this end. Infantry is the one arm which will never be outmoded, even in a push-button war of mass destruction, since it will always be required to occupy ground won from an enemy. Any effort devoted to improving its fighting efficiency, at a time when vast sums of money are being expended upon costly and complicated new weapons as yet unproved as to their effectiveness, is, therefore, well spent.

The Air Aspect

As development continues, airborne troops will be less and less restricted by the availability and size of aircraft or by equipment dropping limitations. It may reasonably be anticipated that armies will be increasingly transported and supplied by air, although the fuel supply problem may become a limiting factor.

Infantry, however it may be transported, will require intimate fire support immediately at hand. Field artillery will, therefore, continue to be required to meet this need. Improved accuracy of artillery fire should result in a corresponding economy in equipment and ammunition. Tactical aircraft will operate as air artillery to provide reinforcing fire support, and fire support for the initial stages of an airborne landing or a swift ground maneuver.

Impact of the VT Fuze

The proximity fuze may be expected to have considerable impact on tactical doctrine. Infantry can no longer expect the same degree of protection from slit trenches or from dispersal in the open. Artillery must be provided with overhead protection

if it is to survive counterbombardment fire. Armor, including armored personnel carriers, can advance directly under a continuous VT-fuzed barrage. Beach assaults will prove more costly. Proximity-fuzed shells fired from mortars, rocket launchers, tank guns, or field guns may well lead to the reintroduction of some form of body armor. Not without justification has the proximity fuze been referred to as the second most important development of World War II.

Night Combat Aids

The improvement of artificial aids to vision at night, such as infrared devices, may be anticipated, leading to a radical change in the form and scope of night operations. New and improved radar devices will assist in detecting enemy ground targets and improving artillery and tank fire-control systems. Further improved communications will speed up the tempo on the battlefield.

Specially developed clothing and equipment will enable warfare to be conducted in the arctic regions. However, the strategic requirement for flexibility in operations will demand that such equipment be also capable of operating satisfactorily in the tropics.

Unorthodox Warfare

It is proposed now to return to the more unorthodox weapons referred to earlier and to consider their possible influence on existing tactical concepts.

The Atomic Weapon

The atomic weapon, as known today, would appear to be limited tactically to use against large concentrations of troops, major strong points, large supply depots, and key points on lines of communications such as railway centers and ports. Unless mobility, deception, and ease of control are greatly increased, the concentration of appreciably superior forces will no longer be practicable. A large-scale amphibious assault, such as that recently conducted on the Normandy beaches, would be inviting disaster. This will bring forth requirements for equipment to facilitate rapid concentration for battle.

Strategically, the bomb has enormous possibilities when used against industry and civilian populations. Defense against it will be mainly concerned with preventing it from being used.

The Bacteriological Weapon

The bacteriological weapon, although as yet unproved, provides a definite threat, the influence of which upon active operations seems likely to be similar to that of the atom bomb although its effect cannot be instantaneous because of the incubation time. It possesses the additional attraction to an aggressor that it will not destroy material. Its effect upon a civilian population may be comparable with that of the atom bomb, and the main defense problem will once again be to prevent its successful delivery.

The Chemical Warfare Weapon

The chemical warfare weapon has still not reached maturity. Its limitations in close combat are well established and it has failed to affect battle conditions fundamentally in the past. It might, therefore, be assumed that protective measures will be devised against future chemical agents as against past ones, and it seems reasonable to assume that battle conditions will not be fundamentally affected in the future. As a weapon of mass destruction used against civilian populations, chemical warfare represents a serious threat comparable with that of atomic and bacteriological warfare.

Summary

Summarizing, atomic, bacteriological, and chemical warfare may all preclude concentrations of any type or magnitude in both forward areas and along the lines of communication in a theater of operations.

They also will limit the size of amphibious operations. They are likely to be used against large centers of civilian population and industry. It is of interest to note that these weapons may all be used by a nation on the verge of defeat, if not to secure victory, to ensure that defeat is mutual.

Finally, it is proposed to consider the new vehicles by which these weapons may be delivered at long range: guided missiles, both in the form of pilotless aircraft and rockets. It is the supersonic rocket which offers the greatest possibilities and which can probably only be countered by another guided rocket. Although their effectiveness relative to their cost has yet to be determined, guided rockets carrying conventional high-explosive warheads will be available to armies shortly for use in the roles of long-range artillery and antiaircraft artillery. In the former role, they may supplant tactical support aircraft having the added advantage that they can operate in any weather or conditions of visibility. In the antiaircraft role, they may render bombing by piloted aircraft impracticable, only to hasten bombing by pilotless aircraft and guided rockets.

Conclusion

It may be concluded that Karl von Clausewitz's theory concerning the influence of fighting and equipment upon each other has been amply substantiated by the experience of two recent major conflicts. Consideration of the possible developments of the next quarter century does not indicate any likely departure from his doctrine.

Thus, each new offensive or defensive weapon and each change in tactics which is introduced into warfare brings forth in due course another weapon or change in tactics to restore the fighting balance. Major General J. F. C. Fuller has called this phenomenon the "constant tactical factor." It might well be called the "law of conservation of the species," for unless every type of offense can be countered, man may well annihilate himself. The hydrogen bomb is a case in point.

Warfare is no longer restricted to the battlefields as it was in Clausewitz's day, and in these days there are such things as psychological weapons and civilian "fronts." However, if his theory be broadened to cover every aspect of total warfare as practiced nowadays, it will still be found to hold good.

In building the foundation of our modern national defense we have come to realize that our Nation, and its allies, cannot hope to match the massed manpower of the potential enemy in any future war. We must overcome this deficiency by fielding armies that are scientifically equipped and trained. This Nation's greatest offensive weapon is embodied in the scientific and industrial genius of our people, and we must be prepared to take full advantage of this situation.

Major General E. F. Bullene

Armored Warfare

Digested by the MILITARY REVIEW from an article by
Lieutenant General Sir Giffard Le Q. Martel in the "Royal Air Force Quarterly" (Great Britain) April 1952.

Two new corps came into existence for use in battle during World War I. One was the Royal Flying Corps which was formed shortly before the war and by its actions it showed quite clearly the very great part that this arm would eventually play in war. The other was the Royal Tank Corps which took an equally prominent part. There was an affinity between these two corps, both of which used mechanical power for the first time in war and they were both dependent on the use of the internal combustion engine.

During World War I, the work of the Royal Tank Corps was centered almost entirely on assisting the infantry to break through strong defenses. For this purpose, we had to use large and heavy tanks. Before the end of the war, however, we had already seen that this new mechanical power would have to be used for the mobile role in battle as well as in trench warfare. For this purpose, we demanded faster and lighter tanks which would have the increased mobility which was necessary for this role. Only a few of these faster tanks, however, arrived before the end of the war, and this mobile role was never tried out.

After World War I

After the war, there was a reaction against tanks. As they had only been used in trench warfare, they were classed as siege weapons, and were not considered as likely to assist very much in the main tasks that would face the Army in the future. On our side, in the Tank Corps, however, we were determined to develop faster and lighter tanks for the mobile role, and we were convinced that we would be able to resurrect the form of warfare by which cavalry in past campaigns had won great victories at high speed and with comparatively little loss. We developed the right type of tank and also the technique for this new form of mobile warfare. Unfortunately, a long period of financial crisis stepped in, and although we had made this progress, we could not equip the Army on these lines except on a very small scale.

The Germans Built Mobile Tanks

The Germans, on the other hand, copied all our ideas and they built great numbers of mobile tanks. With these machines they were able to train their large force of panzer divisions for several years before World War II. Against this we could only pit two half-trained and half-equipped armored divisions on the outbreak of war.

A Lesson in Mobile Warfare

As a result, we saw those famous victories carried out by the panzer forces. They overran Poland in 18 days and France in a month. This was equivalent to the greatest victories by cavalry forces in bygone days. It was a tragedy that our Nation, who had invented and developed all these ideas, should have been left quite unprepared for war. Moreover, it should be noted that the German air forces co-operated very closely with the panzer divisions throughout these operations.

Heavy Tanks Were Required

Although this work was almost entirely mobile warfare, we realized in our country that position warfare would arise at times and that heavy tanks would be needed for this purpose. It is of interest that Germany built no heavy tanks—other than experimental models—between the two world wars. Hitler was determined to win the war at high speed and indeed he came within an ace of doing so. He probably realized that if he did not win almost at

once he would lose in the end. Hence, he concentrated on the mobile role.

In our country, we kept to our original policy and developed both heavy tanks for position warfare and faster machines for the mobile role, which were called cruiser tanks. The *Matilda* was a fine heavy tank, and when I was commanding the 50th

The hard-hitting, 50-ton *Centurion* tank.

Division I had a brigade of these tanks when I met Rommel with his mobile tanks at Arras in 1940. With the support of these tanks we inflicted heavy casualties on his panzer division, but we could take no part in the mobile warfare that followed. The *Matilda* was followed by the *Churchill*, which was another very good heavy tank at the time.

On the mobile side, we did not do so well. There were many delays, but in the end we produced the *Cromwell* and the *Comet*, both of which were excellent cruiser tanks for use in this role.

A Case in Point

At this time, I was the commander of the Royal Armoured Corps. The production side for tanks did not come under me though I expressed our views, of course, as to what we needed. Early in 1943, I was sent to be the head of our military mission in the Soviet Union and left the armored forces. It then seems that no attempt was made to produce the next model of the heavy tank. As a result, we fell down badly on that side, and we were shot off the battlefield by the German heavy tanks in the latter stages of the war. The Germans had changed almost all their productive capacity to heavy tanks after they saw that they had failed to achieve a decisive victory in the USSR in 1941.

Our armored divisions did well and their training and technique carried them to final victory. We would, of course, have won the final campaign at a cheaper price if we had also developed the heavy tanks for use in position warfare.

After World War II

We went sadly astray in certain directions after World War II. We have seen that if we had built up a number of armored divisions instead of so many infantry divisions between the wars we might have stopped Hitler's rapid advance and saved France. This might well have halted the entire war. We made the same mistake again after the war. The only possible enemy was the Soviet Union, and she had great numbers of infantry divisions. It was not until much later that she was able to build up armored forces, and they are still very short of mechanical transport on which armored forces so largely depend. The right course for our country was, therefore, again to retain as many armored divisions as possible. If the threat from the Soviets developed, we would then have been able to send mobile armored forces, between their columns, to attack them in flank and rear. This is the form of warfare which the Soviet Union dreads. Of course, the full support of air forces would be needed for this role, and infantry divisions would be required to hold firm bases from which these armored divisions would operate. Most of these divisions could be supplied by France or Belgium.

Unfortunately, we did the exact opposite and disbanded nearly all our armored divisions and concentrated on raising a large manpower army to meet the Soviet masses. This army would have been far

inferior in numbers to the Soviet Army and would have had little chance of success.

The Position Today

During the past year, great changes of policy have taken place. We now realize the foolishness of trying to take on the Soviet masses in this way. Instead, we

The *Comet*, an excellent cruiser tank.

are now concentrating on raising as many armored divisions as possible.

Armor and Western Defense

It is now agreed that the Western nations must raise a total of 40 or 50 divisions of which half should be armored, and we must produce our share of these. All these divisions must be standing on the ground available for use at any moment and at full strength. These divisions should be ready within the next 2 years. We will then be in a position to ensure that the Soviet Union carries out the treaties that she signed before she crossed her frontiers and advanced westward into Europe. She was under contract to establish democratic rule in accordance with the will of the people in each of these countries which she overran. Instead of this, she established Communist autocracy complete with slave armies and concentration camps. The beginning of a return to peace in the world will come when we free these countries and ensure that the Soviet commissars and their forces return to their own frontiers. We cannot reach this stage unless we have the necessary forces, though I do not think that actual war in the form of a third world war is likely.

Several Types Required

In addition to the difficulty of raising these forces, which must, of course, contain a strong German contingent, we have the problems of providing the equipment and munitions of war. Here again, we are somewhat handicapped by false policies which followed immediately after the war. For instance, a decision was taken that we would only have one main type of tank and that this would be used for both the mobile and the position role. The officers with the most experience in armored warfare gave it as their view that this policy would not succeed. This dual-purpose tank was the *Centurion* and it appeared just after the war. The component parts of

The *Churchill*, one of the wartime heavies.

this tank, such as the engine, gearbox, and transmission, were all used during the war in other types of tanks, and as a result they were thoroughly tried out and tested. As a consequence, the *Centurion* tank was an excellent machine and thoroughly reliable. It is not, however, the ideal type of tank for either the mobile or position warfare role. It is not powerful enough under modern conditions for the heavy role, and it lacks the high degree of mobility which is needed for the mobile role.

It is now accepted that this policy was

a grave mistake. A heavy tank is now to be provided which will be an excellent tank for heavy fighting. For the mobile role some of our wartime cruiser tanks, such as the *Cromwell* and the *Comet*, are being used and they are still suitable for this role. I cannot say whether it will be possible to overcome the difficulties and increase the mobility of the *Centurion* tank for use in the mobile role. I would myself have preferred to have kept to the two types of heavy and cruiser tanks, but there will, of course, be plenty of uses for the *Centurion* tank in war, for such purposes as semimobile warfare.

Mobility versus Strength

The general policy of the Western nations seems now to be settling down on the lines that we suggested earlier. This consists of the use of considerable numbers of armored divisions equipped with cruiser tanks of one type or another. It is becoming accepted that these divisions should be used in a highly mobile role to attack the enemy in flank and rear. They must use their mobility to avoid attacking strength. Mobility replaces strength and numbers. This is the way to take on the Soviet masses if war should arise. At the same time, there must be the heavy tanks to support the infantry divisions that are holding pivots or firm bases from which the armored divisions are operating. These may be organized in regiments that form part of the infantry division or in separate tank brigades.

Objections have, of course, been raised to this broad policy. Statements have been made that the highly mobile warfare carried out by the panzer forces in the early stages was only possible because the enemy was demoralized and that it was really a pursuit. This is not true. The Poles fought magnificently and so did the Soviets and the French. This form of very mobile warfare could certainly be repeated today if the Western nations had the necessary forces.

A Need for Co-operation

Then the point is raised that as the Soviets now have large numbers of tanks it is they who will attack us on these lines. We must, however, remember that the Soviets are very short of mechanical transport for mechanizing such a very large army. When one sees a Soviet armored division, he finds that the tank brigade may be up to strength but that the mechanized infantry and artillery which play such an important part have sometimes been reduced to quite small units because of the lack of transport. As a result, their state of training in co-operation between all arms is a long way behind that of the Western nations. When it comes to a clash between the armored divisions of the two sides, I do not think we will have undue difficulty in establishing our superiority. The Soviets have also built a large number of heavy *Stalin* tanks with the idea that they will serve to protect their infantry divisions from attack by our armored divisions. These *Stalin* tanks, however, do not possess much mobility and our armored divisions should certainly be able to evade them and carry out their role.

The Influence of Air Power

Finally, we must remember that operations of this nature would be very difficult and perhaps impossible without a considerable degree of air superiority. This is a subject on which my readers may be better informed than myself, but I have seen the Soviet air forces in their country. They now have considerably more aircraft and much more modern types than when I saw them, but they are a long way behind the Western nations in organization and administration. They have also had much leeway to make up to reach our level. I find it hard to believe that they will be able to face up to the combined air strength of the Western nations for any length of time.

Oil Power and National Policy

Digested by the MILITARY REVIEW from an article by Flight Lieutenant C. K. Kumar in the "Indian Air Force Quarterly" January 1952.

THE world has gone crazy about oil. The oil situation which has been in the headlines almost all this year has been going from bad to worse.

Why all this fuss? What is behind this mad quest for oil? The answer is simple—self-preservation. Oil is the life blood of our century. We are living in an "oil age." One-fourth of the total energy of the world is derived from petroleum. As a source of power, heat, light, and lubrication, it is unrivaled. A world without oil and its derivatives is unimaginable. The automobile runs on oil. Aviation owes its existence and development to high-octane gasoline. All modern ships are powered by petroleum. Petroleum greases and oils are indispensable to industry. In millions of homes in the world, kerosene-oil affords the only cheap and suitable illuminant at night. Besides, it supplies us with cosmetics and perfumes, wax for polishes, ink for printing, dyes, and asphalt paving for roads. Aluminum, synthetic rubber tires and rubber goods, and a host of other products could not be manufactured without petroleum. No country with any industrial ambitions can survive without it.

Essential for peacetime requirements, it is of vital importance to military strategy and its possession or otherwise can mean the difference between victory and defeat. Bombers and fighters in the air, battleships on the seas, and armored vehicles on the ground are all fed on one type of oil or the other. The mechanization of modern armies, the substitution of oil for coal as motive power by navies, and the expansion of air forces have made oil and its byproducts an indispensable military necessity. In modern wars, mobility is a prime factor in the fighting quality and striking power of the armed forces. During the last war, half the supplies going to the fighting forces consisted of petroleum and its products. It has been truly said that the "allies floated to victory on waves of oil." Clemenceau has gone to the extent of saying that a drop of oil is worth a drop of blood. It can be safely concluded that during war, it is a strategic material of the highest importance, and a serious shortage of oil can be disastrous. Oil has been and will be a decisive factor in war.

The Political Aspect

Evidently, each country would strive its utmost to ensure an adequate supply of petroleum at all times. Command over oil supplies would be among the important aims of national diplomacy. Certain factors, however, make this business of acquiring oil a very complicated affair, full of explosive possibilities. First, the sources of supply are few, widely scattered, and unevenly distributed. Second, the supply of petroleum in the bowels of the earth is not inexhaustible. According to present estimates, the total proved reserves of oil—actually located by drilling or other tests—in the storage basins of the earth is estimated at about 95 billion barrels, which would last the world about 25 years at the present rate of consumption, unless there are discoveries of new deposits. The demand for oil and its derivatives is, however, accelerating at a very high rate. The world demand for petroleum is now 20 times that in 1900, and a few years hence production may not be able to keep pace with the demand. The data concerning the petroleum demand and production and the world's proved resources of crude pe-

troleum are revealing (see Figures 1 and 2).

The Leading Producer-Consumer

It is clear from this data that the United States is by far the largest producer and consumer of petroleum. She produces and consumes more oil than all the world put together. Her investments in the world oil industry run to astronomical figures. Until recently, she was one of the largest exporters of petroleum and its products. In the current years, however, her domestic demand for this product has increased tremendously, and in spite of the fact that she produces more than half of the world's output, she has begun to import oil in considerable quantities. Moreover, she is drawing rather heavily on her proved reserves. Unless there are fresh discoveries of oil in her territory, according to some estimates, her reserves may not last her for more than 15 years. In that case, she may have to look more and more toward Venezuelan oil for meeting her essential requirements.

Major Petroleum Exporters

The Middle East and Caribbean areas are the largest exporters of petroleum and its products today. It is, however, significant that while Venezuela, the chief producer in the Caribbean area, with her reserves estimated at 9.98 percent of the world reserves, is producing 14.39 percent of the world's output, the Middle East, with reserves estimated at 50.42 percent of the world reserves, is only producing oil at the rate of 16.81 percent of the world's output. The reasons are not far to seek. While the United States and Venezuela started production more than a hundred years ago, production in the Middle East countries in commercial quantities started only at the turn of the present century. The largest source of oil lies in the Middle East, and, in the years to come, there will be a big scramble for Middle East oil. The center of gravity is shifting to the Middle East.

This is the crux of the matter—a little more than half of the West's proved oil reserves is in a virtually unprotected and volatile Middle East—next door to the Soviet Empire. Here, in a dangerously exposed salient, is the largest source of oil for the future democracies.

Politics *versus* Oil

It will also be seen that apart from the United States and the Soviet Union none of the industrialized nations, especially the United Kingdom, Germany, France, Italy, and Japan, produce sufficient oil within their own frontiers, while a number of nations who are not advanced industrially, and cannot use up their oil resources, produce oil in vast quantities. The result of this unequal distribution has been a world-wide struggle for this invaluable mineral. Competitive national efforts to acquire control of oil resources have resulted in serious international rivalries, jealousies, and quarrels. Economic and military dependence of certain countries on foreign countries and foreign enterprises for their petroleum requirements have made this product the bone of contention. Politics and oil have been mixed up in dangerous proportions. The politics of the great foreign states who do not own any oil, but need it in vast quantities, and the small local states who own the oil, but use little of it, are in serious conflict. A secret war has been going on for possession of this liquid gold and the entire story reads like a melodrama.

The "have nots" have had to evolve an oil policy in accordance with their economic and military requirements, their financial resources, and their geographical position. The United Kingdom has no oil wells of any importance in her own territory, yet she, next to the United States, is the second oil power in the world. She was the first country to realize the importance of oil in peace and war. Her oil policy consists largely of acquiring in-

terests in the companies engaged in production of petroleum in all parts of the world and maintenance of a large fleet of tankers. As Britannia rules the waves, her her oil imports from abroad, and did not have to worry about developing synthetic fuel or finding alternative resources.

Germany, on the other hand, could not

Daily World Petroleum Demand and Production by Areas 1947 and 1950*

Areas	*Domestic Demand (Barrels)*	*Domestic Production (Barrels)*	*Percent of World Total*	
			Domestic Demand	*Domestic Supply*
1947:				
United States	5,449,200	5,451,600	62.36	61.45
Other North America	487,300	178,400	5.58	2.12
Total North America	5,936,500	5,630,000	67.94	63.57
Caribbean Area	181,600	1,319,500	2.08	15.89
Other South America	262,300	105,700	3.00	1.24
Total South America	443,900	1,425,200	5.08	17.13
Europe (Excluding the USSR)	1,010,600	167,400	11.57	1.62
USSR	578,000	523,600	6.62	6.20
Africa	180,300	24,700	2.06	0.29
Middle East	168,800	839,200	1.93	10.13
Far East and Oceania	419,500	90,600	4.80	1.06
Total World	8,737,600	8,700,700	100.00	100.00
1950:				
United States	6,491,000	5,900,300	59.13	52.12
Other North America	525,900	286,300	4.79	2.67
Total North America	7,016,900	6,186,600	63.92	54.79
Caribbean Area	225,800	1,647,600	2.06	15.83
Other South America	469,300	119,700	4.27	1.11
Total South America	695,100	1,767,300	6.33	16.94
Europe (Excluding the USSR)	1,451,400	215,100	13.22	1.56
USSR	770,000	745,000	7.01	6.96
Africa	276,100	46,900	2.52	0.44
Middle East	256,300	1,742,800	2.33	16.81
Far East and Oceania	512,400	262,100	4.67	2.50
Total World	10,978,200	10,965,800	100.00	100.00

* World Oil, 15 July 1951.

FIGURE 1.

supplies are assured both in peace and in war.

France has acquired one-fourth share in the oil industry of Iraq, which is her principal source of supply of crude petroleum. She has created a vast refining industry at home for refining imported crude oil. During the war, she banked upon Britain's mastery of the sea for seriously rely on imports from abroad in case of war and she made every effort to develop her home resources to the utmost by intensive exploitation of her wells, the manufacture of synthetic fuel from coal, and the production of synthetic products as substitutes for derivatives of petroleum, generally known as ersatz products. During the war, she was in a posi-

tion to meet more than a third of her requirements from her own resources. Japan evolved a similar policy to meet her oil requirements during the war.

India's Oil Problem and Its Solution

India is not a major producer of oil. Her oil industry is confined to a small area in northern Assam. Digboi is the major oil field in this area. During the war, its output was of unusual importance, because of its close proximity to the scene of fighting. In 1950, output from this area was estimated at 3,051,000 barrels, which represents .08 percent of the world's production for 1950. This only represents about 5 to 7 percent of the annual requirements of India for petroleum, which are now estimated to be in the neighborhood of 3½ million tons a year. Until World War II, Burma supplied the major portion of our requirements. In the postwar period oil has been imported mostly from the countries of the Middle East.

We are not happily placed in respect to natural petroleum resources, but in this, we are not alone. We have to look things squarely in the face and evolve an oil policy of our own, consistent with our requirements for national defense. All of our oil supplies from abroad are sea-borne. In the event of an outbreak of hostilities, continuity of oil supplies to us would depend upon the good will and foreign policy of the powers engaged in petroleum production and upon transportation. It must be realized that during World Wars I and II, Britain, as the dominating power in India at that time, was responsible for the flow of oil supplies to us. We cannot now place complete reliance on continuity of adequate supplies during any armed conflict in the future. A failure in the supply of oil would bring our entire fighting machine to a standstill.

A Problem to Solve

We must, therefore, evolve ways and means to reduce our dependence upon foreign imports of oil, at least to the extent necessary to feed our armed forces during a war. While considering ways and means of doing so, we should not be guided by economic and financial reasons alone. Considerations of national defense should have prior claims. Our oil policy should be calculated to increase production from indigenous sources to the maximum and reduce our dependence upon imported oil. Our Government appears to be well aware of the problem and is taking all possible steps in this direction. The adoption of measures along the following lines would go a long way in easing our difficult oil situation:

1. *Intensified geological and geophysical prospecting of possible areas of occurrence of natural petroleum.* An intensive effort for exploration of India's petroleum resources is necessary. Latest improved prospecting methods should be used for the discovery of new oil fields. Specialists in petroleum geology and geophysics from foreign countries should be invited to carry out a complete survey of "possible" areas.

There are reports of geological and geophysical prospecting of areas in Cutch, Saurashtra, Kathiawar, Kangra Valley, Assam, and Tripura. The results of exploration, carried out in these areas so far, are not very encouraging. The Assam Oil Company, carrying out prospecting operations in Assam, seems to have struck some oil in Barsillah. Fuller reports are still awaited.

2. *Setting up of refineries in India for refining crude petroleum.* This would be a step in the right direction. It would result in a considerable amount of saving of foreign exchange, and it would help in the establishment of a chemical industry based on petroleum products. Another indirect advantage would be the storage of considerable stocks of crude petroleum and refined products in the country, which would be a great asset during any armed

conflict. The only refinery at present working in India is at Digboi in Assam. This refinery refines locally mined crude oil, and meets a very small part of India's requirements.

Our Government has already moved in the matter. At the request of the Government, British and United States oil companies in India brought out a technical committee to investigate the possibility of setting up an oil refining industry in India, to produce refined petroleum products from imported crude petroleum. The committee estimated that the cost of establishing refineries in India would be very great and the product of such refineries would be more costly than imported products. For these reasons, the oil companies were reluctant to pursue the scheme. The proposal for the establishment of oil refineries in India was mooted 3 years ago, but recent developments in Iran have imparted a new urgency in giving concrete shape to it. The Government has made new favorable proposals to the major oil companies and has asked them to reconsider the question.

3. *Developing synthetic oil from coal.* Since our country is deficient in natural petroleum, the development of synthetic petroleum is a matter of the highest importance to us. Synthetic oil from coal has been produced successfully in Germany, Japan, and the United States. During the war, Germany was able to meet one-third of her total requirements of oil from this source. The kind of coal from which this oil could be made is available in sufficient quantity in India. Gasoline from coal would be more expensive than from natural petroleum, but considerations of national defense should outweigh economic considerations. While it may not be practicable or possible to meet all our needs of petroleum from this source, it should be possible to meet a substantial portion of the demand of the armed forces and essential services for this product in the event of an outbreak of hostilities.

World's Proved Reserves of Crude Petroleum

Distribution of the world's estimated petroleum reserves as of 1 January 1951.

Areas	*Percentage of World Reserves*
United States	30.17
Venezuela (Caribbean area)	9.98
Middle East	50.42
USSR	5.85
Other Countries	3.58
Total	100.00

FIGURE 2.

The possibility of producing synthetic oil from coal has been under examination with the Government of India. Early in 1948, the Council of Scientific and Industrial Research set up a committee to work out a scheme in consultation with a United States firm for the setting up of a synthetic petroleum plant in India. As a first step, the firm had suggested the establishment of a small plant, which would produce 70,000 tons of aviation gasoline, 28,000 tons of motor gasoline, and considerable quantities of other petroleum products. The Government has accepted the principle involved under the scheme, but the question of capital outlay is being considered by the Planning Commission.

4. *Distilling power alcohol to serve as a useful supplement for petroleum.* India has already established a number of distilleries for the production of power alco-

hol and present production is estimated at 9,143,592 gallons. A mixture of 20 percent alcohol with gasoline is considered most suitable. The establishment of new distilleries and legislation to enforce the use of power alcohol is under contemplation.

Conclusion

One may ask whether petroleum is really very important and whether it will be able to hold its own in the dawning atomic age. With the application of atomic energy to commercial, industrial, and military uses, will it still remain the life blood of our century? To this we shall unhesitatingly say "Yes." While future developments regarding the application of atomic energy are still uncertain, one thing is certain, that at least until the turn of the present century, there is little possibility of atomic power or any other fuel replacing oil in considerable quantities. Because atomic power is so complicated and because it involves entirely new engines, its use will probably not spread so rapidly as that of oil, which, after 90 years of commercial development, has not entirely replaced much older fuels. Although atomic power may supplant oil in some special fields, the prospects are that oil will remain the king of fuels throughout the remainder of the twentieth century.

The New Naviation

An Examination of What Jet Aircraft Mean to the Royal Navy

Digested by the MILITARY REVIEW from an article by C. B. Bailey-Watson in "The Navy" (Great Britain) January 1952.

SOME 40 years ago, when the airplane intruded upon naval thinking, it was not a brusque or ill-mannered interruption; it was, on the contrary, rather diffident. However, the interruption was made and, for the first time in centuries, an entirely new factor entered the naval concept of strategy and tactics. In case it should be thought that this is giving the airplane more than is due, by comparison with the other great advances in maritime progress such, for example, as the advent of steam, armor plate, the torpedo, the submarine, and so forth, I think it is fair to say that, whereas these advances only extended the ambit of classical naval operations, the airplane introduced an entire new dimension.

By contrast with the centuries of naval history, the four decades of naval aviation are, of course, a fleabite. Nevertheless, the progress made during those 40 years has been enormous, and just as the ship underwent a metamorphosis by sail giving way to steam, and iron and steel replacing wood, so, too, has the airplane undergone tremendous change in the course of its development. There was, perhaps, nothing fundamental in the change-over from wood and fabric to all-metal construction, at least not to the extent of the comparable change from wood to iron in the ship. However, just as the advent of steam revolutionized the ship, so did the advent of the gas turbine revolutionize the airplane.

However, it is now more than 10 years since the first jet aircraft made its maiden flight in this country; it cannot, therefore,

be regarded any longer as novel. The Royal Air Force first-line fighter strength is 100 percent jet filled, while production of jet bombers is proceeding apace. Why, in this event, the Royal Navy has but two jet squadrons—and neither of these is yet operational—is a matter for examination elsewhere than in this article. However, the impact the jet aircraft has made, and is making, on naval aviation is inherently a part of the matter, and it is with this aspect that I shall deal here.

First of all, it must be realized that the differences between the orthodox airscrew-driven aircraft and the jet-driven aircraft are manifold and diverse: suffice it is to say that the modern jet fighter, by comparison with its classical airscrew-driven counterpart, is nearly twice as heavy, nearly twice as fast, and can attain nearly double the altitude. In general—more's the pity—the aircraft's basic armament has not undergone a like increase, although some recompense is afforded in the number, variety, and weight of punitive "stores" which can be hung on. Although a simple and effective method, the external carriage of rockets, bombs, torpedoes, and so forth exacts a considerable aerodynamic penalty; but, of course, in design for war, expediency always triumphs over refinement.

Problems to Solve

It can be said with some degree of justice that an aircraft is no better than its operational facilities. On the basis of this premise, it is easy to understand why the Royal Air Force should have so many jet squadrons, and the Navy so few. With runways thousands of yards long, and full servicing and maintenance sections on the spot; with a highly developed and fully integrated control organization covering the country; with, in short, no cramping premium on space or numbers, the restraining hand on the operational development of land based jet aircraft has had a relatively light touch. However, when all the primary elements and many of the secondary elements of that background have to be provided within the comparatively minute volume of a ship, then the problem becomes one of very real magnitude. As such, it is not something which can be solved either quickly or easily. A solution—perhaps no more than a partial solution but, nevertheless, a start—is to be found in the new carrier, HMS *Eagle*. Although laid down in 1942, and launched in 1946, the ship has undergone a good deal of design revision during her construction, with the result that she is now going into commission as the most up-to-date vessel of her kind in the world.

It is, of course, a natural corollary that as aircraft developed over the years, the carrier developed as well, and it is thus patent that, with the coming of such very different types of aircraft, the carrier should also reflect the magnitude of the change. So long as aircraft were driven by piston-engine airscrews, the intrinsic demands made upon the carrier changed relatively little over the years. Certainly, as aircraft speeds and weights increased, the desirability for larger flight decks naturally followed on, but in the event, it is likely that larger flight decks occurred as something of a second-order result from the unremitting necessity to provide greater hangarage and deck park capacity. From the point of view of the pilot, of course, the bigger the flight deck, the better, but in spite of the United States Midway-class carriers *(Midway, Coral Sea,* and *Franklin D. Roosevelt),* and the new 60,000-ton USS *Forrestal* now being built, the fact remains that the very large carrier presents difficulties of its own in war, not the least of which, perhaps, is that docking facilities are limited.

Demands on Carriers

What, in point of fact, are the demands made on a carrier by jet aircraft? Well, as already stated, a jet fighter flies nearly twice as fast as its orthodox counterpart,

and as in this world advances in one direction almost always mean paying for them by penalties exacted in some other direction, the *minimum* speed of the jet aircraft is higher than that of its predecessor. The increase of speed at the low end of the scale is nothing like the increase in maximum speed, but it is nevertheless appreciable, and, therefore, the jet aircraft becomes airborne and lands at speeds a good deal faster than those which ruled until a few years ago.

The Flight Deck Problem

As the modern fighter weighs almost as much as did the medium transport aircraft of a decade ago, it will readily be appreciated that, landing as fast as it does, such an aircraft takes a good deal of stopping. Thus, arrester gear must be of considerably increased capacity. However, the deceleration which can comfortably be borne by the pilot is limited, and, therefore, it is necessary that the arrester wire pull-out—that is to say, the aircraft's distance-to-stop—be increased. However, the amount of flight deck which can be given over for landing space is also limited, and thus it is that the carrier designed for the operation of jet aircraft is equipped with many more, and closely spaced, arrester wires.

Again, in a piston-engine airscrew-driven fighter, there is well over a ton of good, big engine and propeller between the pilot and the scene of the accident. However, in most jet aircraft, the pilot sits well in front and, the engine being behind him, he is rather in the position of the meat in the sandwich. Consequently, crash barrier design has to be changed. The Americans, incidentally, have an ingenious barrier consisting of a fabric strip which is engaged by the aircraft's nosewheel, and this triggers off a steel cable which rises *behind* the nosewheel to catch the much-stronger main undercarriage legs, and so bring the aircraft to a halt. This device is reported to work well, and has the advantage that it does not damage the fuselage of the machine or, more important, endanger the pilot.

For fundamentally the same reasons that arrester gear for jet aircraft need to be of greater capacity, so, too, is greatly increased performance demanded of the catapult. But here, again, pilot acceleration limitations mean that, in order to provide the requisite enhanced end-speed, the catapult trolley-travel must necessarily be longer.

The Problem of Fuel Supply

The gas turbine is, unfortunately, dipsomanical as far as fuel is concerned and, therefore, for a given number of flying hours' utilization by a carrier's aircraft complement, the ship's stowage capacity for aviation fuel must necessarily be larger than that which suffices for the needs of piston engines. As a result of its power-unit's high fuel consumption, the jet fighter has normally a lower endurance than the piston-engine fighter. From this it follows on that the turn-round time between landing-on a strike of aircraft, refueling them, rearming them, and respotting them for take-off tends to lessen. The tankage capacity of the jet aircraft is, however, larger; to refuel them, therefore, in even the same time as that required for piston-engine types imposes the necessity for a higher-speed fueling system.

An entire new technique for handling aircraft on the flight deck has had to be evolved for jet types, and this means that the aircraft handler has new lessons to learn. Although an airscrew serves as an extremely efficient guillotine for the uncautious passer-by, the aircraft handler is not seriously incommoded by its slipstream. A jet exhaust, however, has all the characteristics of a mammoth blowtorch, and the man who stands in its path does not stand there long. It also behooves one not to pass too close to the air intake of a jet aircraft: more than

one person has been sucked against the orifice and badly hurt.

The combination of circumstances arising from the dangerous effects of the jet exhaust at close quarters, and the high fuel consumption of the engine (positively voracious at low altitudes), means that the old order of ranging aircraft for free take-offs, with engines being started 10 minutes before take-off time, can no longer hold good. It would seem to be unlikely that jet fighters will ever be ranged in close order from which to proceed to free take-off, not only because of the exhaust effects, but also because the initial acceleration of jet aircraft is somewhat slower than that of airscrew-driven types. When the jet machine is moving at 50 knots or so, the acceleration picks up enormously, but it is the distance required to attain that 50-odd knots that is the bugbear. Thus, although free take-offs by jet aircraft have been, and almost certainly will continue to be, made from carrier flight decks, the accepted normal method of getting a strike of jet machines into the air is virtually bound to devolve on the catapult.

Operational Techniques

We have seen that the thirst of the turbojet engine restricts endurance, and it has also been emphasized that the jet fighter flies nearly twice as fast as its predecessor. Now an efficient carrier is able to get airscrew-driven fighters into the air at free take-off intervals of 12 to 14 seconds. The comparable interval between catapult launches is of the order of 35 seconds. The interval between the first and last to get airborne of a strike of, say, 12 aircraft (assuming a launching interval of 35 seconds) is roughly 6½ minutes. To an airscrew-driven aircraft, a period of 6½ minutes does not loom very large, but to a jet aircraft it is a matter of vital importance; in fact, it is of such import as to be unacceptable.

The obvious answer is to decrease the launching interval. The actual acceleration given to the aircraft by the catapult cannot, as already pointed out, be increased very much because of the strain imposed on the pilot. The entire process can be speeded up by the use of an automatic centering system for positioning the aircraft on the catapult, but this must be regarded only as a contribution and not a solution. The only solution (within the author's knowledge, that is) lies in the provision of more catapults and, while the new carrier, HMS *Eagle*, has two which, of course, are of advanced design, the huge new USS *Forrestal* is to have no fewer than four.

Summary

Just as the jet aircraft has imposed a number of drastic revisions in carrier design, so has it also had its effect on what may be termed the operational direction system employed by the ship. Necessarily, this is a subject about which the veils of secrecy are tightly swathed, but even although we are perforce unable to delve into these aspects of the over-all picture, sufficient has, perhaps, been said in this article to make it clear that the impact of jet aircraft on naval aviation has been profound.

BOOKS OF INTEREST TO THE MILITARY READER

THE STATE OF LATIN AMERICA. By Germán Arciniegas. 416 Pages. Alfred A. Knopf, Inc., New York. $4.50.

By Lt Col Donald L. Durfee, *Inf*

Here is a very controversial book which will probably be banned in those countries where, according to the author, free speech and freedom of the press are curbed by dictatorships. In it, Señor Arciniegas explains how the dictators come to power and are overthrown, what the dictators are doing in their countries, and the lip service they give in support of the democratic ideals of the United Nations while abolishing those same ideals within their own countries. The role of communism is discussed together with the reasons why it will fail in Latin America.

The author criticizes United States foreign policy because the United States recognizes the governments of these dictators and supplies them with arms for hemispheric defense—arms that are actually used to keep the same dictators in power.

The State of Latin America is recommended reading for all military personnel and especially those who are contemplating an assignment south of the Rio Grande. It must, however, be read with an open mind, remembering that the statements and conclusions drawn are those of the author, and not necessarily those which another observer might draw.

A factual error in discussing Brazil gives rise to doubts as to how well acquainted the author is with the other countries of Latin America which he discusses. In general, however, it is a good study with plausible conclusions.

Señor Arciniegas, a Colombian, has spent considerable time teaching at universities and colleges in the United States.

HOW TO CO-EXIST Without Playing the Kremlin's Game. By James P. Warburg. 228 Pages. The Beacon Press, Boston. $3.00.

By Capt William H. Beauchamp, *CE*

Convinced that peaceful co-existence of the United States and the Soviet Union is at once possible and imperative for our Nation, Mr. Warburg presents an extensive brief for this point of view in his latest book. Since 1945 he has been calling for what he considers to be a more positive direction of our foreign policy, and his writings reflect sincerity of thinking and provide an interesting criticism of national policy in this field.

The bulk of this volume is devoted to a study of the need for co-existence, which the author feels is a basic necessity if we are to preserve our present way of life. Having outlined this necessity, he discusses how this co-existence can be firmly established by give and take between the world's two great power centers. Mr. Warburg summarizes his policy in six imperatives which include both goals and techniques, and mentions that our present policy takes into account only one of these imperatives, the technique of increased military strength to prevent the further spread of communism.

THE MILITARY GENIUS OF ABRAHAM LINCOLN. By Brigadier General Colin R. Ballard. Introduction by Fletcher Pratt. 246 Pages. The World Publishing Co., Cleveland. $5.00.

By COL GEORGE C. REINHARDT, *CE*

Opponents as well as protagonists of the national staff idea will do well to study this fascinating essay written nearly 30 years ago and rescued from obscurity by Mr. Pratt. "There is no doubt that in a war of nations the Higher Command is a necessary part of war organization," concludes General Ballard. "It deals with such factors as politics, finance, industry; only after these are settled can we get down to pure strategy and tactics in the field."

Abraham Lincoln's remarkable ability to get to the root of a problem enabled him to perceive this need 50 years ahead of his time. That he personally, devoid of the advice of a trained staff, formulated this country's true war aims, adhered to them faithfully, and achieved them in a manner compatible with a lasting peace is the true measure of his strategic genius, Ballard asserts. Analyzed in the author's simple, unbiased style, the thesis cannot be lightly rejected.

No claim for tactical skill is submitted in Lincoln's behalf. On the contrary there is proof, refuting some historians' charges of interference with field commanders, that he left tactics entirely to his generals. But in the areas now assigned the "Higher Command," Lincoln used his near-dictatorial powers ruthlessly and brilliantly. Politically he unified the many schisms in the North in support of the war; his international policy avoided conflict with initially unfriendly Britain and France without giving in to them in the vital strategy of maintaining the blockade. At the war's end, the Union was again intact, its industry flourishing, its finances sound. Lincoln won both the war and the peace that followed.

General Ballard does not hesitate to point out the Great Emancipator's errors, but by keen examination of the evidence the author dispells many long accepted fallacies.

The preface avers that such an estimate as this would have been logical after World War II "showed that the kind of command Lincoln exercised had become a permanent feature of war." It rightly concludes that the surprising fact that it was written immediately following World War I "increases its validity today."

THE ANATOMY OF COMMUNISM. By Andrew M. Scott. 197 Pages. Philosophical Library, New York. $3.00.

By LT COL MICHAEL J. REICHEL, *TC*

This book provides a new approach to the theory and practice of communism. The author has endeavored to explore the inner workings of communism, to lay bare its anatomy, by analytical exposé of its preachings and of the actual relation of Marxist and Marxist-Leninist thought to Communist practice.

The Anatomy of Communism, although essentially a study, reaches no over-all conclusion. Many conclusions, however, may be drawn throughout its pages. In one part the author attempts to show that most of the important elements in the Marxian theoretical system cannot stand up under critical analysis. He does this by quoting from the writings of Marx, Lenin, Engels, and other exponents of dialectical materialism, then by comparison and analysis brings out the ambiguities, the errors, and the contradictions that exist within them.

The remainder of the study concerns itself with an examination of communism in the Soviet Union today.

The Anatomy of Communism is a valuable addition to the growing list of books on communism, valuable in that it cuts through the confusion that usually surrounds the subject and gets to bedrock.

DOCTORS IN BLUE. By George Worthington Adams. 253 Pages. Henry Schuman, Inc., New York. $4.00.

By COL JOHN R. HALL, JR., *MC*

This is a layman's history of the Army Medical Service of the Union forces during the Civil War. It is written in nontechnical terms in an easily readable form, although the work is based upon painstaking research of medical documents. The period is of great importance, since it covers the work of Jonathan Letterman, who is considered the father of the modern concept of military medical support. Most of the armies of the world now build their medical services around the Letterman concept.

The Civil War was marked by a high incidence of disease, much of which had its origin in ignorance, stupidity, jealousy, inefficiency, and uninformed arbitrariness. Behind these are also seen great advances in scientific knowledge. These advances in knowledge are marked by the earnestness of the medical workers, the co-operation of the commanders, and the translation of new knowledge and theory into an efficient medical service through the integrated action of these individuals. Conversely, many of the failures and poor practices are shown to stem from the lack of these qualities. The reader will be surprised to learn of the lack of foresight into and understanding of some of the basic medical problems on the part of highly placed military leaders of the day.

This book provides the military man with a visual and word picture of the horrors of war in terms of sick and wounded without the tremendous scientific advantages of military medicine as we know it today. It is difficult to comprehend the problems of the commander when disease killed more than bullets, when wounds of the extremities almost dictated amputation, and when wounds of the chest or abdominal cavities meant almost certain death. The morale problems must have been tremendous.

Any military reader will contribute to his armamentarium as a soldier by reading this book. The solution of medical problems, with the resultant conservation of the fighting strength, by mutual understanding and co-ordinated effort of the commander and his medical service is well summarized in this short volume. Staff surgeons will consider it mandatory reading for themselves and their lay as well as medical associates. An excellent note concerning sources of information will be of value to readers of military history.

THE WORLD CRISIS AND AMERICAN FOREIGN POLICY. By Willian L. Langer and S. Everett Gleason. 794 Pages. Harper & Bros., New York. $7.50.

By IVAN J. BIRRER, *Ph.D.*

This book is a detailed political history of the United States from President Roosevelt's "quarantine" speech on 5 October 1937 through the "Destroyer Deal" of 2 September 1940. In its 794 pages the reader is given a meticulous step-by-step development of American foreign policy. Each step is exhaustively treated. A wealth of source data accompanies each development—much of this data has not heretofore been published. This volume is by no means "popular history." It is a professional treatment written by two recognized professionals. It will be a fundamental source volume for many years to come.

BATTLE REPORT. Volume VI. The War in Korea. By Captain Walter Karig, Commander Malcolm W. Cagle, and Lieutenant Commander Frank A. Manson. 520 Pages. Rinehart & Company, Inc., New York. $6.00.

MILITARY AIRCRAFT OF THE USSR. By Charles W. Cain and Denys J. Voaden. 72 Pages. Herbert Jenkins, London, England. 3 shillings, 6 pence.